Dates & Date Cultivation of the 'Iraq

BY

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Agricultural Directorate of Mesopotamia

PART I.

The Cultivation of the Date Palm on the Shat Al 'Arab

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FOREWORD

THE information contained in this memoir has been collected at intervals during the past three years, and particularly last year (1919), when, through the kindness of Lieut.-Col. E. B. Howell, C.S.I., C.I.E., I.C.S., the Revenue Secretary, and of Lieut.-Col. R. J. D. Graham, D.Sc., the Director of Agriculture, the author was given facilities for making extended enquiries on the Shat Al 'Arab for a period of three months during the date harvest. The value of the data has been much increased owing to the exhaustive corrections and helpful criticism freely given by Capt. R. Thomas, B.Sc., Officiating Director of Agriculture, to whom the author is glad to acknowledge his indebtedness. His thanks are due also to Major A. H. Proctor, D.S.O., I.M.S., Officer Commanding Bait Naama Officers' Hospital, for his kindness in allowing the author to stay for the harvest at Bait Naama, in the midst of the biggest and most productive date gardens of the country, and to Lieut.-Col. Gordon Walker, I.C.S., Political Officer and Military Governor, Basra, for liberally supplying him with transport. Major C. R. Wimshurst, B.Sc., has been good enough to give permission for the publication of Plates 23, 24, 25, 28, 51 and 53, and Capt. H. E. Shortt, I.M.S., has given similar permission in the case of Plate 19. The author's assistant, Abd Al Karim ibn Hamdi, was most useful throughout the course of the inquiry.

Parts II. and III. of the memoir will be published under separate covers. Part II. will contain a discussion of the statistics collected with a view to discovering a broad basis for the equitable taxation of date gardens, and Part III. will describe the varieties of dates and date palms to be found on the Shat Al 'Arab.

V. H. W. DOWSON.

TRINITY HALL, CAMBRIDGE,
October, 1920.

LIST OF ABREVIATIONS

A.	Arabic.
Bd.	Baghdad,
Cf.	Compare.
E.	English.
E.g.	For example.
H.	Hindostani
I.e.	That is.
Mb.	Moosaib.
N.	North.
P.	Persian.
Pl.	Plural.
S.A.A.	Shat Al 'Arab.
Syn.	Synonym.
Var.	Variety.

Note.—All remarks in this note are to be taken as applying to conditions on the Shat Al 'Arab only, unless otherwise stated.

CONTENTS

Dates and Date Cultivation of the 'Iraq.

1. DEFINITION

THE date palm of the 'Iraq belongs to the order *Palmeae*, to the genus *Phoenix*, Linnaeus, and to the species *Dactylifera*, Linnaeus. Prof. Gammie (Department of Agriculture, Bombay, Bulletin No. 30) thus describes the genus:—

"A moderately tall palm. Stem stout, rough with the persistent bases of spiny petioles. Leaves pinnate, pinnae scattered, rigid, lanceolate. Spadices several, interfoliar, erect, afterwards drooping, branched. Spathe basilar. Flowers small, dioecious. Male flowers; sepals of perianth cupular, three-toothed, petals three, obliquely ovate, valvate, stamens six. Female flowers; sepals three, globose, accrescent, petals three, rounded, imbricate, staminodes six, free or connate, carpels three, free, stigmas sessile, hooked. Fruit oblong, terete, one-seeded, perianth (misprint for 'pericarp'?) fleshy, endocarp membraneous. Seed oblong, ventrally grooved, albumen equable or subruminate."

PLATE 1

Prof. Willis (*Flowering Plants and Ferns*, Cambridge University Press, 1919) thus describes the species:—

"*P. dactylifera*, Linnaeus (date palm, Africa, South-West Asia). It has a columnar stem covered with old leaf-bases; the leaves are pinnate. Flowers

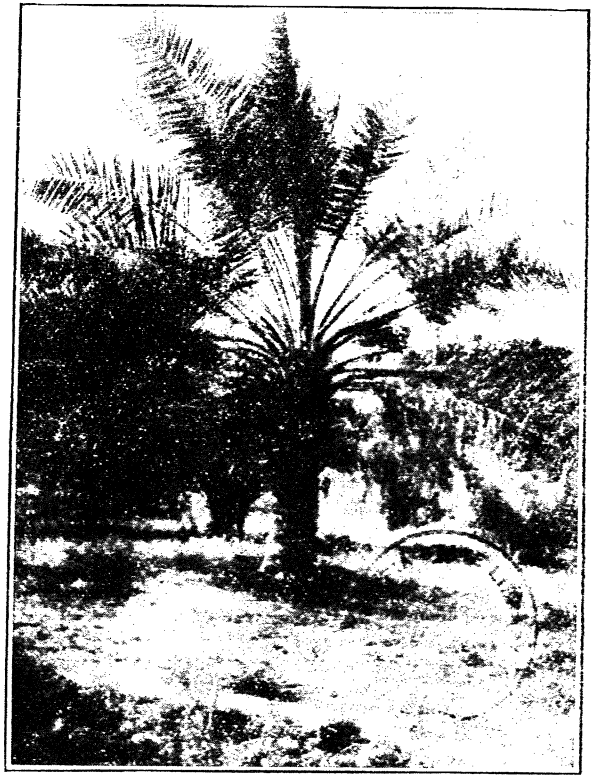

PLATE 2

PLATE 3

dioecious ; the Arabs fertilize the female spadix by hanging a male over it. Berry, seeds with hard, cellulose endosperm. It yields fruit, wine, sugar, hats, mats, thatch, etc."

The Arabs of the Shat Al 'Arab recognise five stages in the growth of the palm:—

1. *Farakh.* (=*ṭala* on the Euphrates.)
2. *Khisa.* (Near Mohammera, this term is used for what is elsewhere known as *Neshwa.*)
3. *Neshwa.*
4. *Rabaiya.* (Near Mohammera, *Neshwa* and *Rabaiya* are used indiscriminately.)
5. *Tawila.*

The *Farakh* is the offshoot or sucker, whether still on the palm or just planted out. The *Khisa* is the young palm before it begins to bear either fruit or offshoots. The *Neshwa* bears fruit and offshoots. The *Rabaiya* has ceased, as a rule, to bear offshoots, but is in the period of maximum bearing of fruit. The *Tawila* is a tall and aged palm, past its prime. Some varieties mature later than others. ZAHIDI generally is considered the earliest to mature, and may bear fruit five years after planting out. Some of the choicer varieties (*e.g.* BARHI) probably require twice as long. Cultural and climatic conditions also affect the rate of growth of a palm. If they be favourable, the palm will bear much sooner than if they be unfavourable. Thus the palms in France and in Cornwall do not bear any fruit at all. Hence it is not easy to define the five stages in terms of years, but the following may be taken as being the limits :—

1.	*Farakh.*	On parent palm	0 to 8 years from first appearance of bud on parent palm.
		After transplanting	3 to 9 ,, ,, ,,
2.	*Khisa*	.. .. ..	4 to 20 ,, ,, ,,
3.	*Neshwa*	.. .. ..	5 to 30 ,, ,, ,,
4.	*Rabaiya*	.. .. ..	12 to 60 ,, ,, ,,
5.	*Tawila*	.. .. ..	30 to 100 ,, ,, ,,

Plate 1 shows a HALAWI *farakh* in the foreground, and immediately behind it an ISTAAMRAN *rabaiya.* (Koot Adh Dhahi, 14/10/19.)

Plate 2 shows a HAMRAWI *neshwa.* (Daaiji, 10/9/19.)

Plate 3 shows a HAMRAWI *tawila.* (Daaiji, 25/9/19.)

2. DISTRIBUTION

The date palm as a rule matures its fruit only in a rainless land of intense and prolonged summer heat. Rain prevents fertilisation of the flowers and maturation of the fruit. Nevertheless, palms must be supplied liberally with water at their roots if a heavy yield of fruit is to be obtained, although they may manage to keep alive for several years without fruiting in very dry situations. These requirements limit the habitat of the date palm to the irrigable dry belts on either side of the tropics of cancer and capricorn. The more important date regions of the world are Tafilet in Morocco, Biskra in Algeria, Jerid in Tunisia, Fezzan in Tripoli, the middle Nile valley, the oases of Arabia (Mekka, Medina, Jowf, Hofhoof, Hassa, Maskat, etc.), the 'Iraq and S.W. Persia, and N.W. India (Multan, Dera Ghazi Khan, Muzaffargarh, etc.). Of all these the largest single area is that in the southernmost part of the 'Iraq, bordering the Shat Al 'Arab. Comparatively recently, date palm cultivation has been introduced into Arizona (Phoenix, Yuma, Tempe, etc.), Damaraland and Namaqualand, and into South Australia (Hergott Springs, Lake Harry, and Oodanatta), but there are apparently no date palms in the Atacama desert, the corresponding dry region in South America.

Purely as an ornamental tree the date palm may be grown outside the above-mentioned areas. There is one palm growing so far north as Cornwall, and Brandis states that in Bordighera there are four thousand palms, whose function is to supply Rome with palm " branches " on Palm Sunday. Several ornamental date palms are grown, but do not fruit, in the damp climate of Florida.

In the 'Iraq the date palm flourishes everywhere it is watered and attended, from Ana on the Euphrates and Samara on the Tigris southwards. North of these towns the winters are too cold, though there are five palms at Tekrit and several at Erbil. Major Wimshurst, B.Sc., Government Agricultural Entomologist, has reported that most of the palms in the Erbil district were killed by the great frost of A.H. 1326 (1909–1910 A.D.).

The most important area of date cultivation in the 'Iraq, and, indeed, in the world, is that of the Shat Al 'Arab. Both banks are lined with date gardens from Fao to Qarna, a distance of one hundred and eight miles. The average width of this date belt on either side of the river is, perhaps, a mile. Thus there would appear to be about one hundred and thirty-eight thousand acres of date palms in

this region. The left bank of the river from Mohamera to Fao, a distance of forty-two miles, is in Persian territory, so that of purely 'Iraqi date gardens in this region there are about one hundred and eleven thousand acres. From considerations discussed in Part II. of this note, the average number of date palms an acre on the Shat Al 'Arab appears to be about one hundred and forty. Hence, the total number of palms in this area might be estimated at from fifteen to sixteen million. Fairchild, in 1901, quotes an estimate that there are five million palms here.

Baghdad, the next largest date cultivation centre in the country, lies amongst twenty miles of date gardens lining both banks of the Tigris. Kadhimain, a suburb to the north-west, has fifty-two thousand bearing date palms, but figures for the rest of the area are lacking. Fairchild states that in Baghdad and Hilla together there are over a million date palms, but omits to give the process by which this figure was produced.

Nearly all towns in the 'Iraq are surrounded by date groves, and on the Euphrates date groves are common even where there are no towns. After the two main areas of date groves above mentioned, the most important, roughly in order of precedence, are :—(1) Shithatha and Rahalia oases, (2) Husainia Canal, (3) Middle Euphrates towns, (4) Lower Euphrates towns, (5) Ramadi, Hit, Haditha, Ana, (6) Baqooba, Mendali, Badra, (7) Amara.

3. CULTIVATION

SOIL.

The date palm grows in a variety of soils, in the rocky, limey loam of Zorbatia, in the river silt of the Shat Al 'Arab, and in the desert sand of Shaiba, and is more tolerant of salt than any other cultivated crop in the 'Iraq. Water-logged soils and soils which are too dry are unfavourable, though palms will withstand both these adverse conditions for many years. The best dates that the 'Iraq produces grow close to the limestone hills in the neighbourhood of Badra and Mendali.

TILLAGE.

Although the date palm will live and grow for fifty years with no tillage whatever yet it will not give a good crop unless the land about it be thoroughly cultivated. The best tillage is given in the Shat Al 'Arab district, where, every fourth year, the land is dug with the Arab spade (A. *Mis-ha*) to a depth of about four feet. Three men, known as '*Amoor* (from A. '*Amara* =he cultivated) work together. The custom is for them to work only from early morning to noon, and for this they are paid about two rupees each at Abool Khasib, where labor is more expensive than anywhere else on the Shat Al 'Arab. At Daaiji on the opposite (left) bank of the river, each man is paid one rupee four annas (season 1919). The average wage for the whole district is between thirty and thirty-six rupees a week for the three *amoor*. The three will take between one and two months to dig an acre. Ploughing between the palms is not practicable at Basra because of the numerous, deep water channels which intersect the gardens, but in Baghdad, and elsewhere, where the channels are shallower, ploughing is often practised. Owing to this high rate of pay, caused by the demand for labor of all kinds and by high prices, many garden-owners have not been able to afford to have their gardens dug thoroughly since the British occupation, and as a consequence the yield of their dates in some cases has decreased since Turkish times. The price of dates has not increased proportionately with the cost of labor. Even before the war, a large number of gardens were tilled badly, more especially *waqaf* gardens and those cultivated by *taab* cultivators. (*Waqaf* =religious trust. *Taab* =tenant with special privileges; he is usually poor.) On the other hand, it must be remembered that many garden-owners who were also merchants have become very wealthy since the war, and have invested in their gardens the profits of their mercantile activity.

The *amoor* dig down the four feet in two spits, the first of which is called *bis* and the second *kookhsha*. The *bis* is put below the *kookhsha*, old roots are removed, and manure is added, often at the rate of a basket-full to each palm, equivalent to about three tons to the acre, though the amount of manure given to a garden varies a great deal. The owner of one garden declared that he gave each of his HALAWI palms fifteen baskets of manure. This manure is chiefly bazaar sweepings, and is poor stuff, though expensive. For moderately good manure, delivered at the creek edge, forty rupees a ton may have to be paid. HALAWI palms are considered to repay best an expenditure on manure. ISTAAMRAN palms are manured seldom, for not only are their dates cheap, but it is stated that manuring tends to make their fruit squashy, and thus lowers its market value. The Shat Al 'Arab is gradually eating away its right bank and depositing silt on its left bank. Hence the soil on the left bank is newer than that on the right, and is not manured. With the exception of gardens on the right bank of the Shat Al 'Arab and of those round Baghdad, very few gardens in the 'Iraq are manured.

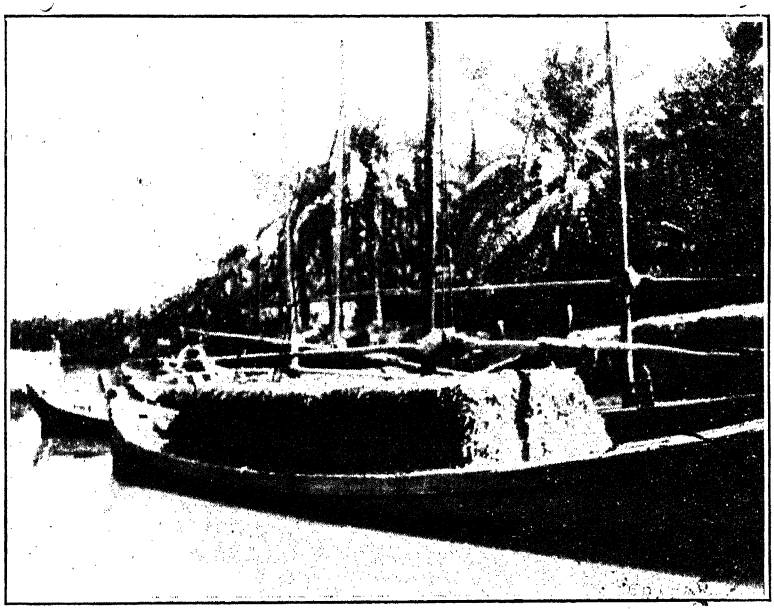

PLATE 4

Plate 4 shows a Basra boat (A. *Chya*) with a load of manure from Basra stables, waiting to be unloaded at a date garden. (Aboo Maghira, 9/9/19.)

Plate 5 shows the manure offloaded from the *Chya* and heaped at the foot of each palm before the digging of the garden begins. (13/9/19.)

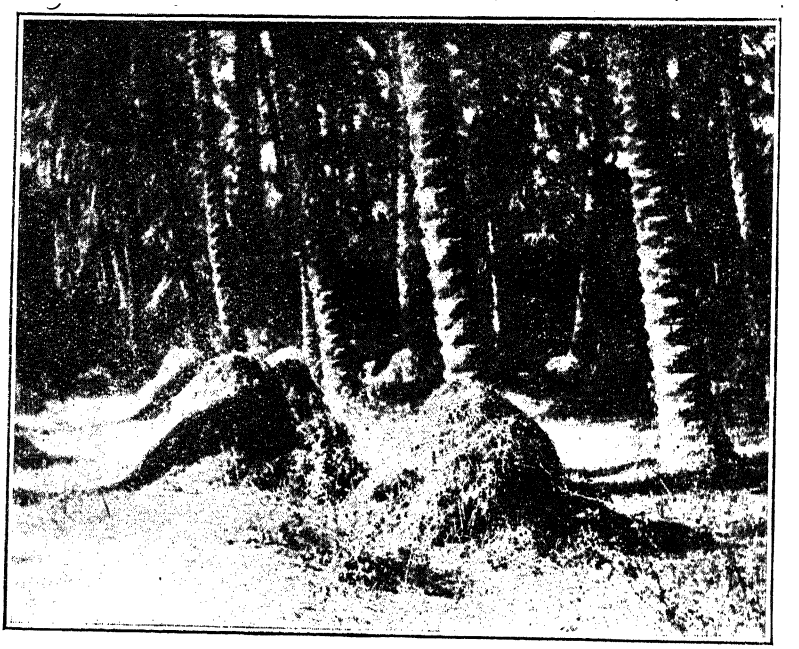

PLATE 5

It would be interesting to observe the effect of manuring with the waste products of 'Araq factories, which consist of the stones and other solid matter thrown away into the river after the second distillation.

A quarter of each well-cultivated Basra garden is dug deeply and thoroughly every year. The remaining three-quarters is given only a shallow digging. This shallow digging is called *Thiara*.

The above account of cultivation applies to that of the best gardens of the Shat Al 'Arab only. At Baghdad and in the other towns where date cultivation is important (*e.g.* Baqooba, Mendali, Badra) cultivation is thorough, but digging is never so deep as on the Shat Al 'Arab. In those areas where date cultivation is not so well understood (*e.g.* in several of the smaller groups of gardens on the Euphrates and Tigris rivers), gardens may be left many years without cultivation. In such cases the yield of the dates is low and their quality inferior.

Plate 6 shows a well-planted garden of ISTAAMRAN palms. Note the straight, clean channel and the straight rows of evenly spaced palms. (Fao, 23/9/19.)

PLATE 6

Plate 7 shows a well-cultivated garden of HALAWI palms. The offshoots are planted out evenly between the old palms which they will replace. (Abool Khasib, 19/9/19.)

Plate 8 shows a well-cultivated garden of HALAWI palms. Summer beans are planted along the banks of the irrigation channels. (Abool Khasib, 19/9/19.)

SUBSIDIARY CROPS.

If vegetables or other intercalar crops be grown then the cultivation which they receive is considered sufficient for the surrounding palms. The following is a list of the subsidiary crops to be found in date gardens. Unless it is otherwise stated in the "Remarks" column, all the crops are to be found on the Shat Al Arab. The low-growing crops named in the following list are usually grown either in clearings amongst the palms or else in those gardens in which the palms are planted widely apart, because otherwise the shade in many cases would prevent the proper growth of the vegetables. The groups, "Fruit Trees," "Vegetables," etc., are arranged approximately in their order of importance. In each group the classification of scientific names is based on that of Engler. Ornamental trees and flowers have been omitted, because as a class they are unimportant, except in a few gardens of wealthy Baghdadis and Basrawis.

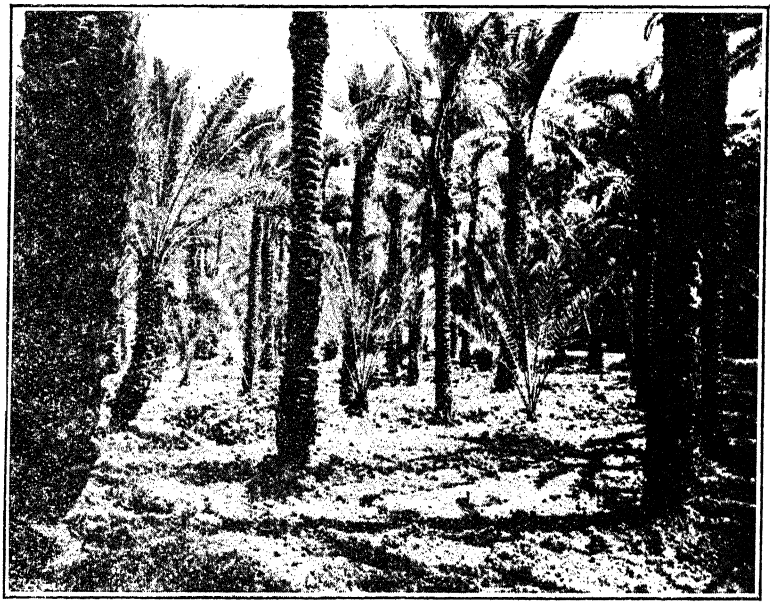

PLATE 7

PLATE 8

LIST OF CROPS TO BE FOUND IN DATE GARDENS.

Scientific Name.	English Name.	Arabic Name. Long vowels underlined	Remarks.
1	2	3	4
A. FRUIT TREES.			
Musaceae.			
Musa paradisiaca	Plantain	*Mōz*	S.A.A., but fruit does not ripen readily.
Juglandaceae.			
Juglans regia	Walnut	*Jōz*	One at Amara, few at Zorbatia.
Moraceae.			
Morus alba	Mulberry	*Tooth*	Fruit called *Tooki*.
Ficus carica	Fig	*Tīn*	
Rosaceae.			
Pyrus Malus	Apple	*Toofa*	Rare S.A.A., but common N. 'Iraq.
Cydonea vulgaris	Quince	*Saferjal*	S.A.A. & Euphrates.
		Haiwa	Tigris.
Prunus Persica	Peach	*Khokh Soofi* ..	Rare.
,, ,, ...	Nectarine ..	*Khokh*	
,, Armeniaca	Apricot	*Mishmish*	
,, domestica	Plum	*Anjās*	Bd. and N.'Iraq.
,, ,, ...	Greengage ..	*Gowja*	,, ,,
,, Cerasus	Cherry	*Aloo Baloo* (*P.*) ..	Jabal Hamrin.
Rutaceae.			
Citrus medica	Citron	*Nārinj*	The commonest Citrus on S.A.A.
,, ,, var. acida ..	Sour Lime ..	*Noomi Hamūdh*	
,, ,, ,, Limetta ..	Sweet ,, ..	,, *Heloo*	
,, Aurantium	,, Orange ..	*Portagal*	Baqooba and N. 'Iraq rare on S.A.A.
var. Bigaradia ..	Seville ,, ..	*Tarinj*	
,, Aurantium var. ..	Tangerine ,, ..	*Eusef Effendi* ..	One tree Amara, few S.A.A. and Bd.
,, decumana	Shaddock	*Noomi Hindi* ..	Rare.

LIST OF CROPS TO BE FOUND IN DATE GARDENS—*continued*.

SCIENTIFIC NAME.	ENGLISH NAME.	ARABIC NAME. Long vowels underlined	REMARKS.
1	2	3	4
Anacardiaceae.			
Mangifera indica	Mango	*Unba*	One tree Amara, few S.A.A.
Rhamnaceae.			
Zizyphus vulgaris	Jujube	*Kunar* (*P.*) ..	Zorbatia.
,, Spina-Christi ..	.. ..	*Sidra*	Fruit, *Nabook*.
Vitaceae.			
Vitis vinifera	Vine	*Anab*	
Cactaceae.			
Opuntia vulgaris	Prickly Pear ..	*Tin Shoki* ..	Few Amara and Mb.
Punicaceae.			
Punica Granatum	Pomegranate ..	*Roman*	
Oleaceae.			
Olea europaea	Olive	*Zaitoon*	
B. VEGETABLES.			
(1) VEGETABLES PROPER.			
Liliaceae.			
Allium Cepa	Onion	*Boossal*	
Chenopodiaceae.			
Beta vulgaris	Beetroot	*Shwanda*	
,, ,, var. Cicla ..	Chardbeet	*Siliq*	
Spinacia oleracea	Spinach	*Spinakh*	
Cruciferae.			
Brassica oleracea	Cabbage	*Lahana*	Mostly Baghdad.
,, campestris ..	Turnip	*Shelgaum*	From P., *Shaljam*.
Raphanus sativus	Radish	*Fijil*	
Malvaceae.			
Hibiscus esculentus	Ladies' Fingers ..	*Bamia*	E. Synonyms :— Long-podded Gombo, Okra, Ockro, Bandakai, H. *Bhindi*.

LIST OF CROPS TO BE FOUND IN DATE GARDENS—*continued.*

SCIENTIFIC NAME.	ENGLISH NAME.	ARABIC NAME. Long vowels underlined	REMARKS.
1	2	3	4
Umbelliferae.			
Daucus Carota	Carrot	*Jizer*	
Solanaceae.			
Solanum Lycopersicum ..	Tomato	*Tamata*	
,, tuberosum	Potato	*Bataita*	Rare.
,, Melongena var. esculenta ..	Egg-Fruit	*Baidenjan* ..	E. Syn. Aubergine.
Compositae.			
Lactuca sativa	Lettuce	*Khas*	
Cynara Scholymus	Globe Artichoke ..	*Toofa Al 'Aradh* ..	Few at Amara.
(2) HERBS.			
Liliaceae.			
Allium sativum	Garlic	*Thoom*	
,, Porrum	Leek	*Krath*	Only tops eaten.
Cruciferæ.			
Lepidium sativum	Garden Cress	*Rishad*	
Portulaceae.			
Portulaca (Sp.)	Purslane	*Barbin*	
Leguminosae.			
Trigonella Foenum-graecum	Fenugreek ..	*Halba*	
Umbelliferae.			
Apium graveolens	Celery	*Krefas*	Only tops eaten.
Petrosilinum sativum ..	Parsley	*Baadenos*	
Foeniculum officinale ..	Fennel	*Shbint*	
Labiatae.			
Mentha piperita	Peppermint ..	*Batanij*	
,, viridis..	Mint	*Naanaa*	
(3) CUCURBITS.			
Cucurbitaceae.			
Lagenaria vulgaris	Bottle Gourd ..	*Aqtin Aboo 'Argab*	
Cucumis Melo	Sugar Melon ..	*Balikh* ['*Ajmi*)	
,, sativus	Long Cucumber ..	*Khiar Taroozi* ..	A. Syn. *Tarakh.*
,, ,, var. ? ..	Water Cucumber ..	*Khiar My*	

LIST OF CROPS TO BE FOUND IN DATE GARDENS—*continued.*

SCIENTIFIC NAME.	ENGLISH NAME.	ARABIC NAME. Long vowels underlined	REMARKS.
1	2	3	4
CUCURBITS—*continued.*			
Citrullus vulgaris	Water Melon ..	*Ruggi*	Tigris.
		Dibshi	Euphrates.
Cucurbita Pepo	Pumpkin	*Shija*	Townspeople.
		Aqṭin	Tribesmen.
,, ,, var. ? ..	Vegetable Marrow	*Aqṭin Aboo 'Arg̱ab*	
(4) PULSES.			
Leguminosae.			
Vicia Faba	Broad Bean ..	*Barjilla*	
Phaseolus Mungo	Green Gram ..	*Mash*	
Vigna Catiang	Summer Bean ..	*Loobia*	E. Syn. Blackeye Pea.
(5) CONDIMENTS.			
Solanaceae.			
Capsicum annuum	Chillies	*Filfil*	
C. CEREALS.			
Gramineae.			
Oryza sativa	Rice	*Shilib*	Very little S.A.A.
Triticum spp.	Wheat	*Hanta*	
Hordeum spp.	Barley	*Shyi̱r*	
D. FIBRES.			
Malvaceae.			
Hibiscus cannabinus ..	Deccan Hemp ..	*Jinab*	Tigris.
		Jiljil	Euphrates.
Gossypium spp. ..	Cotton	*Goolan*	
E. FODDER.			
Leguminosae.			
Medicago sativa	Lucerne	*Jet*	

List of Crops to be found in Date Gardens—*continued.*

Scientific Name.	English Name.	Arabic Name. Long vowels underlined	Remarks.
1	3	3	4
F. DYES.			
Lythraceae.			
Lawsonia inermis	Henna	*Henna*	*Hanoon* in Yeman.
G. OIL PLANTS.			
Leguminosae.			
Arachis hypogaea	Groundnut ..	*Fistiq Abid* ..	Recently introduced.
Pedaliaceae.			
Sesamum indicum	Sesame	*Simsim*	

As the crops grown in the date gardens are so many and of so diverse natures, it readily may be understood that the cultivation of the gardens varies between wide limits. (*Cf. e.g.* a garden under lucerne with one under rice.) In the most profitable gardens, the space between the palms is sufficient only for citrus and other fruit trees, and no shadeless patches remain for the cultivation of vegetables and other low crops. The latter generally are to be found in new gardens where the shade from the young palms and trees has not become considerable.

Plate 9 shows a citron tree in an Amara date garden. The palms shelter the trees from the fierce summer wind and from the excessive heat of the sun.

Plate 10 shows plantain palms lining a creek on the Shat Al Arab. (21/10/19.) North of Basra the winter is too severe for the plantain, and even in Basra itself the fruit is of inferior quality.

Plate 11 shows fennel in the foreground and cabbages in the background. (Shat Al Arab, 21/10/19.)

Plate 12 shows a scarecrow (A. *Karooa*) fixed to a palm to protect the cabbage seedlings sown below. (Eusfan, 21/10/19.)

Plate 13 shows beds of leeks in a date garden on the Shat Al Arab. (21/10/19.) Only the tops of the leeks are eaten. In the foreground the leaves have been cut and in the background the leeks are ready for cutting.

Plate 14 shows a plot of lucerne at the edge of a date garden at Amara. (June, 1918.)

When the garden owner (A. *Malak*) leaves his garden uncultivated, he may let the grazing. On the Shat Al Arab there is a great demand for such grazing.

Plate 15 shows Nejdi sheep grazing under palms. (Eusfan, 21/10/19.)

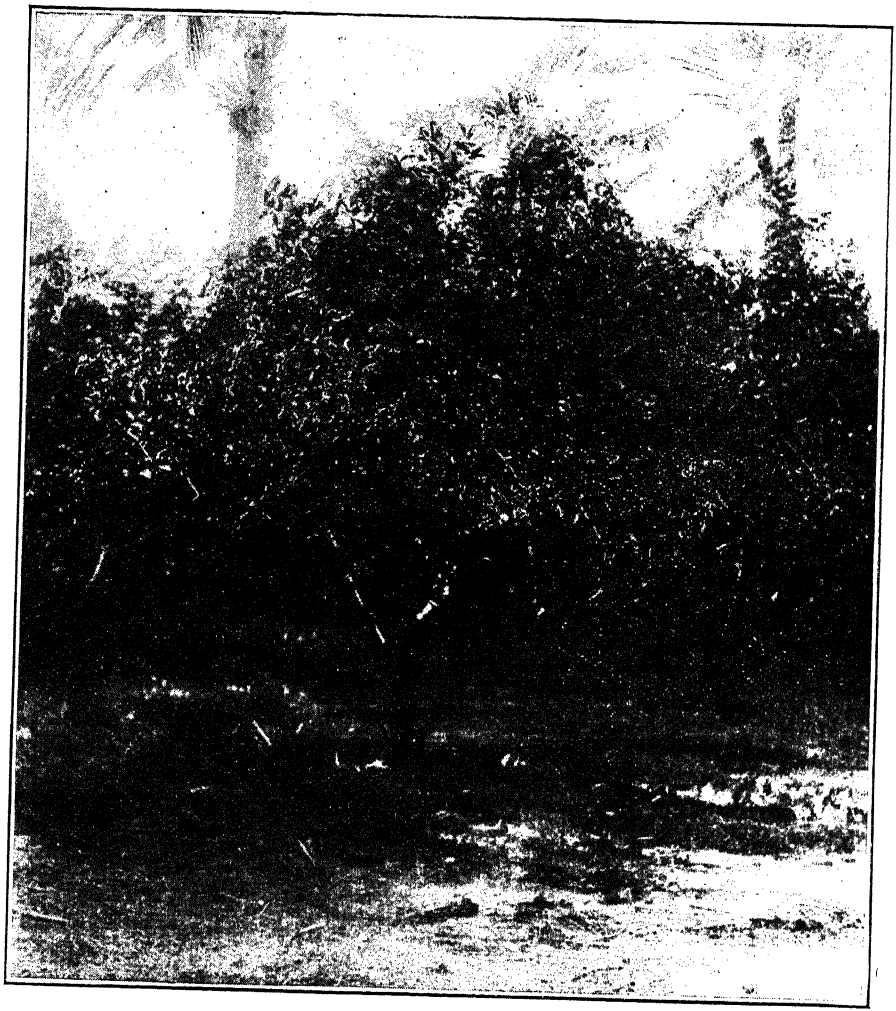

PLATE 9

PLATE 10

PLATE 11

PLATE 12

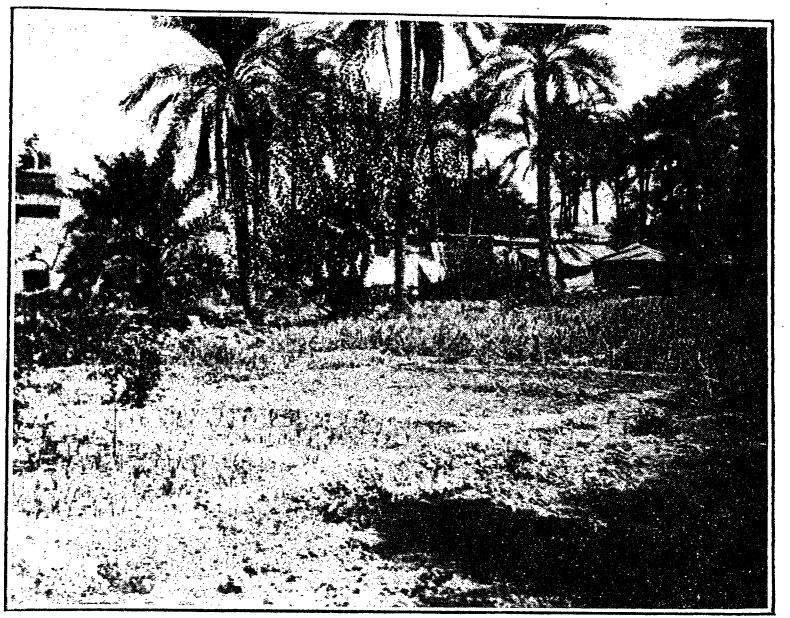

PLATE 13

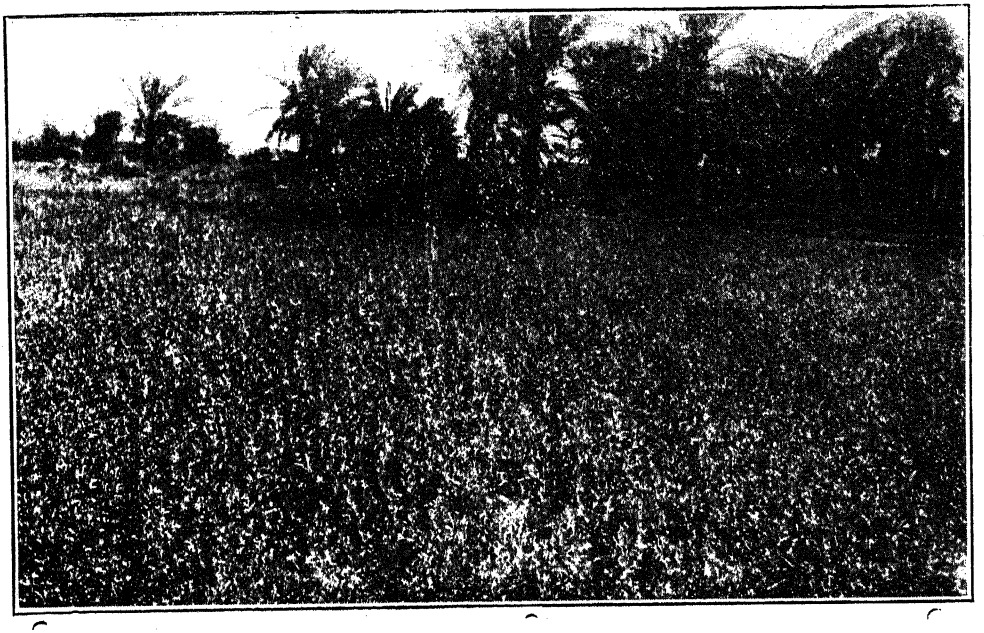

PLATE 14

PLATE 15

IRRIGATION.

Though a palm can live for a long time without being irrigated (*e.g.* those at Shaiba and on the Hilla branch of the Euphrates before the construction of the Barrage), yet in such circumstances it does not bear well, and may not bear at all. For the maximum yield, the roots of the palm must be supplied very plentifully with water, especially during the hotter part of the year.

The date palm appears able to flourish not only under widely differing conditions of soil, but also when irrigated by very different waters. Thus at Baqooba the water is perfectly clear; at Hit coffee-coloured with silt; at Fao often salty; at Shithatha sulphurous; and at Badra charged with a high percentage of magnesium sulphate.

Water is provided by tidal inundation, by gravitation flow, or by lift.

From Fao to Qarna the date gardens are irrigated twice daily with fresh water (salt at and near Fao during spring tides) owing to the action of the tides in the Persian Gulf, which periodically bank up the fresh water in the Shat Al Arab and force it into the numerous creeks and channels which intersect the whole date belt. Thus, all that is necessary for the effective irrigation of the Basra date gardens is the initial digging (A. *Hafriat*) and the periodical cleaning (A. *Chirian*) of the creeks and channels. The tides do the rest. Plate 4 shows a typical Basra creek.

Plate 16 shows a garden of ISTAAMRAN palms at Fao immediately after the retreat of an exceptionally high spring tide, which inundated the garden right over the surface of the soil. (December, 1916.) The usual tide only fills the channels.

Plate 17 shows the smaller irrigation channels of a Basra garden being cleaned out. The implement used is the Arab, long-handled spade (A. *Mis-ha*). (November, 1916.)

On the middle Euphrates, where the Hindia Barrage has made it possible for the level of the water to be raised, many of the date gardens are watered by flow during the summer in rotation. In the Diala area also high level canals provide flow irrigation all the year round, and at Mendali and Badra small dams, made each year in the mountain streams, ensure flow irrigation.

Where flow water be not available, the water must be lifted from the river or from wells. The means used are various.

The *Dalia,* or Primitive Water Hoist. Water is lifted in a leathern bucket (camel hide is the best), though sometimes a kerosene tin is used. This bucket is supported by a rope (or a pole) tied at the upper end to a bar, which, in its turn, is supported by a horizontal pole resting on two uprights, and is weighted at its free end usually with a lump of clay. The rope (or pole) tied to the bucket is pulled downwards by a man standing at the edge of the water until the bucket is pressed beneath the surface of the water and fills. It is now lifted up, the weight at the end of the

PLATE 16

PLATE 17

PLATE 18

PLATE 19

swinging pole assisting its upward progress, until level with the irrigation channel, when it is emptied, and the whole process is repeated. A *dalia* seldom is employed to lift water more than about six feet.

Plate 18 shows a laborer (A. *Fellah*) lifting the leather bucket to the top of the well. (Shat Al Arab, inland, November, 1916.)

Plate 19 shows a double *dalia* directly the buckets have been emptied. These buckets are made out of kerosene tins. (Shat Al Arab, inland, May, 1917.)

The *Charad*, or Animal Power Water Hoist. The bucket is bigger and invariably of leather, and is hauled up over a pulley, and, in order to gain purchase, the animal (cow, bull, bullock, pony, mule, donkey, or, in the Yeman and Morocco, camel) is provided with a steeply inclined ramp down which it walks. The bottom of the bucket is provided with a tail, through which the water is discharged. While the bucket is being hauled up the tip of the tail is kept high by a rope attached to the main haulage rope. On the Euphrates the whole apparatus is known as a *bakra*, and two *bakra* always are worked side by side. The double *bakra* is called a *charad*. On the Tigris the *bakra* generally are placed singly, and are called *charad*. A large camel skin bucket when new costs about fifty rupees.

Plate 20 shows a *charad* at Amara, the bucket of which has just discharged its contents into the small, high-level, irrigation channel. (June, 1918.)

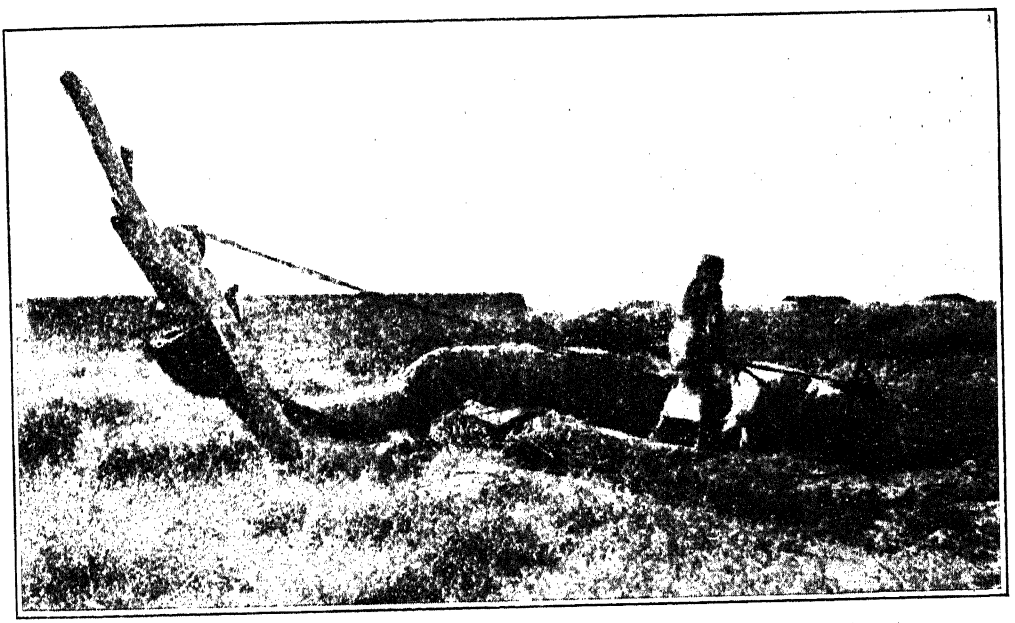

PLATE 20

Plate 21 shows a double *charad* at Zubair, where the water is forty feet below ground level. The pulley wheel is made of a large number of small pieces of mulberry wood, prized for its hardness. The supporting poles are of softer and cheaper silver poplar imported from Mosul. The cost of the leather, rope, and wood-work of such a *charad* as that illustrated in this plate would be about two hundred rupees; the cost of the four, big, white donkeys (working in two shifts) would be about a thousand rupees; and the cost of the digging the big, forty foot deep well and of lining it with brush-wood and mats so that the sandy sides do not fall in would be about two hundred rupees.

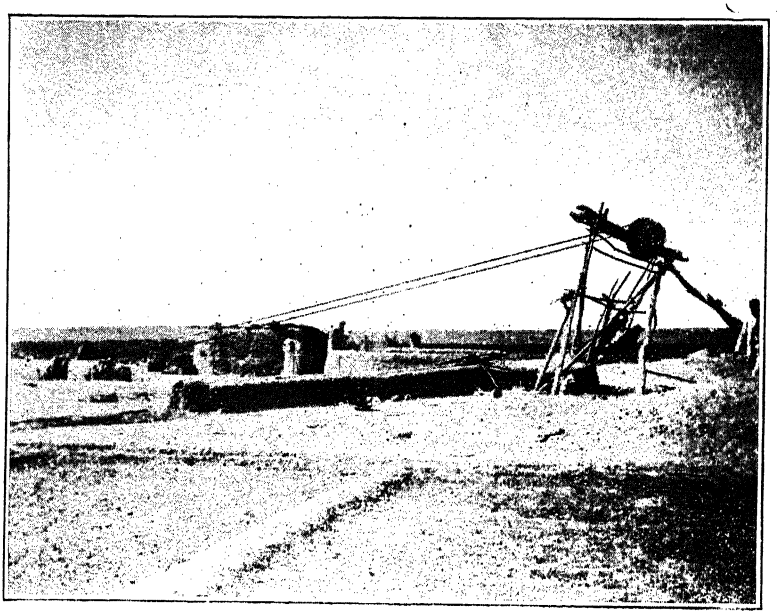

PLATE 21

At Hit gardens are watered by means of big water-wheels, supported on stone dams set at right angles to the direction of flow of the river, and with many gourd-shaped, earthenware gugglets tied to their circumferences. The force of the rapidly flowing water in the river beats on the wings of the water-wheels, causing the latter to revolve, in doing which, water is lifted in the gugglets. When each gugglet begins to descend its water is emptied into the channel which runs along the top of the well or dam which supports the wheels. Nowhere else in the date country on the Tigris and Euphrates are there rapids or is there a firm bottom, both of which conditions are necessary for the comparatively easy construction and successful working of water-wheels.

So far, all the implements adopted for raising water which have been discussed have been made of wood, rope, mud, earthenware, etc., all materials at hand in the country. Progressive garden-owners, who happen to own large gardens, however, have realised that improved machinery gives bigger profits.

The most common improved appliance is the Noria, or Persian Wheel (A. *Naoor*), which consists essentially of an endless chain carried by a wheel which is made to revolve by power provided by animal draft. The animal walks in a circle pulling behind it one end of a pole, the other end of which is attached to bevelled cog-wheels. These cog-wheels are connected with the wheel carrying the endless chain. The chain is provided with zinc buckets. As the chain revolves the buckets in turn dip under the surface of the water in the well or sump over which the Noria is set, fill up, and are carried upwards over the supporting and revolving wheel, when they empty their contents into a trough fixed above the axis of the wheel. The water from the trough is led away to an irrigation channel. Water seldom is lifted more than twenty feet by a Noria.

The animals working the Noria are blindfolded so that they cannot see if the driver be close behind or not. Hence he can sit at his ease in the shade, only occasionally calling to them or flicking them as they pass him.

At Koofa there are several smiths who now manufacture Noria wheels. The price is about four hundred and fifty rupees for a medium-sized machine with foot-wide buckets.

A variety of water-wheel, of which the author has seen one at Moosaib and one in the Yeman, differs from that described above in that instead of an endless chain provided with buckets, there is an endless chain running in a pipe, and fixed at intervals to the former are either rubber or iron cups which fit more or less tightly inside the latter. As the wheel supporting the chain revolves the water partly is lifted and partly is drawn up by suction. The Yeman *Bamba*, as it is called, was worked by a camel. Camels are not employed to lift water in the 'Iraq.

Windmills are not used for irrigating date gardens in 'Iraq, though one is at present under trial at the Baghdad Experimental Station. Some are to be found near Aden, but they do not appear to be particularly successful, for the small gardens which employ them have also to be provided with camel-power water hoists, as the wind is not to be depended upon.

The most effective implement of irrigation for a date garden, though that requiring the greatest outlay of capital, is the centrifugal pump worked by an oil engine. These are very common in Baghdad and in Amara. In the latter place there are twenty-four engines and pumps amongst the sixty-four gardens in the neighbourhood. The maximum lift at Amara is about six feet ; but that at Baghdad is about forty feet.

Plate 22 shows a Gwynne's Invincible centrifugal pump, six-inch suction, eight-inch delivery, at Amara, used for irrigating a fifteen acre date and vegetable garden. (June, 1918.) The twelve-and-a-half horse-power Hornsby engine which works it is inside the hut.

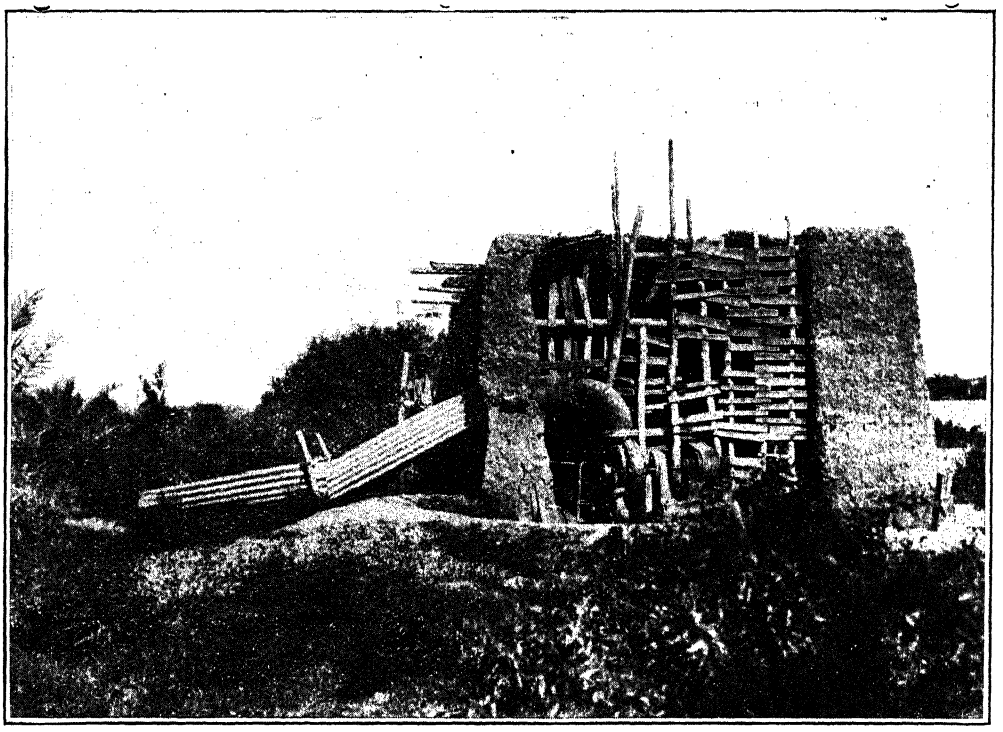

PLATE 22

PRUNING.

Each year the dead and dying outer fronds (A. *Saaf*, pl. *Saoof*) are cut from the palm about a foot from its trunk, either by means of the small toothed sickle (A. *Minjail*) as on the Shat Al Arab, or by means of the heavy, 7-shaped, smooth-edged sickle as in Baghdad and its neighbourhood.

When the palm is about fourteen years old the woody and expanded bases of the fronds (A. *Karib*, pl. *Kariboon*) are cut away close to the trunk of the palm. This operation generally kills any sucker buds there may be, and it is for this reason that it is not carried out earlier. For an example of a palm whose fronds have been cut but not the frond-bases, reference should be made to Plate 47.

These two distinct operations of pruning are carried out at any time of the year when labour is available. Often they synchronize with the artificial fertilization in order to save the *fellah* the trouble of climbing the palms often and also in order that the labour of harvesting be made less difficult.

It is customary, when the dates have grown to a length of about half-an-inch, for the erect spadices which bear them to be pulled down below the fronds with which they are confused, in order to facilitate harvesting. If this operation be delayed until the dates ripen many would fall to the ground and be damaged or lost, because ripe dates are much less securely fastened to their stalks than immature ones. It is also a common practice for the spines to be stripped off the fronds at the same time that the fruit bunches are pulled down, so that they will not get in the way of the *fellah* when harvesting.

FERTILIZATION.

The date palm is dioecious, that is to say the male and female flowers are borne on different palms. Wind pollination cannot be relied upon, and if the pollen from the male flowers do not reach the stigmae of the female flowers, the latter develop into small, stoneless fruit (A. *Shish*) of very little value. Hence, to ensure that fertilization (A. *Ligah*) take place, the *fellah* in every properly cultivated garden takes a sprig of the ripe male inflorescence (A. *Talaa*, or, more rarely, *Goosh*) and sets it firmly in the middle of that of the female. Both the male and female inflorescences are enclosed in woody spathes (A. *Sharaba*, pl. *Sharabat*) which split open before the flowers mature. It is the custom for the whole, unopened, male spathe to be cut from the palm immediately before ripening and the inflorescence extracted therefrom through an artificial incision, and left a day or two in a small basket to mature. In this way no pollen is wasted. If the *fellah* see an unopened spathe among the female inflorescences he is fertilizing, he frequently splits it open and sticks the male sprig amongst its unripe flowers. In a day or so these will ripen, and there will be sufficient pollen left to fertilize them. The *fellah* thus is saved a second journey up the palm.

Plate 23 shows a garden *fellah* with a number of male inflorescences which he has just extracted from their spathes. He is about to split them up into a large number of sprigs for inserting amongst the female flower clusters. (Baghdad, 1918.)

Occasionally, where the male pollen is scarce, or where there is an unusually large number of females to fertilize in a short time, the pollen is shaken out of the ripe male flowers and tied up in a bag of fine muslin. This bag is tied to the end of a stick. The *fellah* can quickly fertilize a large number of female inflorescences by dusting them with this bag.

PLATE 23

PLATE 24

Plate 24 shows a *fellah* holding such a " pollen-bag." In his hand also may be observed his *minjail,* and over his shoulder his *farwend* (explained below). (Baghdad, 1918.)

Plate 25 shows the " pollen-bag " in use. (Baghdad, 1918.)

Plate 26 shows the method of climbing a date palm, supported by the *Farwend* (called in the Yeman *Markadh*). (Daaiji, 1919.) While the bare feet of the *fellah* are firmly pressed to the trunk of the palm, he jerks his body towards the latter, and at the instant that the outward pressure on the *farwend* is relaxed, he raises his hands and lifts the twisted hide thong of the *farwend* with them two or three feet. He then allows himself to fall back on to the basket-work back support of the *farwend* (made out of date leaflets) and brings up his feet a step higher. An experienced *fellah* will climb the tallest palm in this manner with ease and in comparative safety in half a minute. A palm may easily be climbed without the aid of a *farwend,* but the latter is used when work has to be done at the top of the palm, because both hands can then be set free.

Fairchild states that, in 1900 at Mohamera, fertilization was being carried out in the middle of March. The present writer, when in Amara in 1918 and 1919, found this process confined to the month of April. In Moosaib in 1920, a few male flowers and still fewer female flowers were to be seen during the last week of March. Here all fertilization was finished before the end of April.

RIPENING.

In maturing, the date passes through four distinct stages, called by the Arabs of 'Iraq *Chimri, Khalal, Ratab,* and *Tamar.* In Aden the second and third stages are called *Karra* and *Balta* respectively.

The *Chimri* is small, more or less spherical, hard, green, bitter, and unfit for food. The one Basra exception is the *chimri* of the variety SHIRANI, which is almost sweet and is eaten.

The *Khalal* is of the same shape as the matured fruit, though the skin is never crinkled. Of the thirty-five Basra varieties the colour of whose *khalal* has been recorded, approximately fifty per cent. have yellow *khalal,* approximately twenty-five per cent. have red *khalal,* and the remainder have *khalal* of a yellow ground colour with many very fine red spots, giving the whole a clouded red appearance.

PLATE 25

PLATE 26

LIST OF SHAT AL ARAB DATES, SHOWING THE COLOR OF THE KHALAL.

Yellow.	*Red.*	*Yellow ground, red spots.*	*Color not recorded.*
Asabiat Al Aroos	Bobak	As-hag	Atri
Ashgar	Dairi	Braim	Bint As Saba
Ashrasi	Digal	Digal	Barban
Awaidi	Farsi	Digal Jema	Daaili
Barhi	Habsi	Digal Moosa	Digal Abas
Chibchab	Hamrawi	Hadal	Digal Abd Al Ali
Digal	Jozi	Khlas	Doowaich
Gantar	Khasab	Oom Ad Dihin	Hawaiz
Halawi	Khinaiz		Helya
Hasawi			Maktoom
Istaamran			Midad
Khadhrawi			Nooksh Al Mabrad
Khastawi			Oom Al Bakhoor
Lilwi			Shwaidi
Shirani			Sikari
Shookar			Taburzal
Swaidan			
Zahidi			

The *khalal* of the following varieties commonly are eaten on the Shat Al Arab :—

1. BRAIM.
2. BARHI.
3. HADAL.
4. HASAWI.
5. JOZI.
6. LILWI.
7. OOM AD DIHIN.
8. SHIRANI.
9. SHOOKAR.
10. KHASAB.

With the exception of the last named they are sweet, juicy, and pleasant to eat, and are esteemed a delicacy amongst Arabs, though Europeans do not always care for them. A big bunch of the first named may be sold in the Basra market for five rupees at the beginning of the season (1919), and in those gardens which are near the markets the above-mentioned varieties are generally cut as *khalal.* The last-named variety (KHASAB) is the latest of all dates, and, though its *khalal* are rather astringent, yet they are juicy, and the harvest of all the other varieties being over, they very often are eaten. They are exported to Kuwait ; a *Boom*

(large, sea-going vessel, a " Dhow ") will often take a load of KHASAB *khalal* during October. By the time it arrives the pressure and the heat to which the dates have been subjected by being packed on top of each other have turned them into *ratab*.

When there is no convenient market for the easy disposal of BRAIM *khalal* they are boiled and dried and sold as cooked *khalal* (*Khalal Matbookh*). For details reference should be made to the description of BRAIM dates in Part III. CHIBCHAB *khalal* are treated similarly if the number of palms of this variety in the garden make it worth while to do so. If the *malak* has only a palm or two he will let the *khalal* ripen and pack the resulting *tamar* with some more common kind, generally ISTAAMRAN.

When there are only a very few palms in any particular district, *e.g.* at Aden, all the dates are eaten as *khalal*, however astringent they may be.

The *ratab* form of the date is reached when the apex becomes soft and, as its name denotes, moist. The skin usually becomes translucent, and, as a rule, wrinkled, owing to the shrinking of the flesh. Some varieties are wrinkled hardly at all (*e.g.* ZAHIDI), while some are wrinkled deeply (*e.g.* KHADHRAWI). The varieties ASHGAR, BARHI, LILWI, OOM AD DIHIN, SHIRANI, and SHOOKAR are eaten generally as *ratab*, because their flavour in this form is considered better than in that of *tamar*, and because the total crop of all these kinds is so small that it can readily be disposed of locally. *Ratab* dates are too squashy to transport far. There are few delicacies more delicious than BARHI *ratab*. These were selling at Ashar in October, 1919, at thirty rupees for a *man* of one hundred and fifty pounds. All the dates in the *ratab* stage are edible, though some are less pleasant than others (*e.g.* BOBAK and ISTAAMRAN), but most are allowed to ripen completely, because it is only in the *tamar* or final stage that dates can be marketed easily. Some varieties can be picked as *ratab* and left on the ground to ripen into *tamar*, but most are left on the palm until they arrive at the latter stage. When ASHRASI is picked as *ratab* and dried the resultant *tamar* are yellow-brown and form the *chesib* or dried dates of the market, but when they are left to ripen on the palm the *tamar* become black and more toffee-like in consistency.

Yellow *khalal* give, as a rule, a dull brown *ratab* and red *khalal* a purple or black *ratab*. KHADHRAWI *ratab*, however, are often almost sea-green (hence, presumably, the name of this variety), and those of DIGAL JEMA are somewhat of this colour. The *ratab* of ISTAAMRAN are distinctive ; the apical, *ratab* portion black, the basal, *khalal* portion yellow, the two sections being particularly sharply divided.

The *Tamar*, or perfect date, is that stage in which the fruit is familiar in Western markets. The whole of the date as a rule is of a dark colour ; the flesh is generally toffee-like in flavour and consistency ; and the skin is usually dry and wrinkled. There are, however, many exceptions. These will be found noted in the detailed description of each variety.

Dates, as a rule, ripen fairly evenly. Those, however, which ripen before the majority generally fall to the ground, whence they are collected daily by children. Such fallen dates are called *tyish*. ZAHIDI dates fall to the ground less than those of other varieties. On the Shat Al Arab, the first *khalal* (BRAIM) are cut at the end of August, and the last *tamar* (KHASAB) at Christmas time. September is the main harvesting month. The ISTAAMRAN harvest continues the longest of any, perhaps because it is the commonest date. HALAWI is early; ZAHIDI is later. Of the *tamar* of the five most common Basra varieties (ISTAAMRAN, HALAWI, KHADHRAWI, DAIRI, ZAHIDI) those first harvested in 1919 were HALAWI and KHADHRAWI (7/9/19), and those last harvested were ISTAAMRAN (14/10/19). In 1920, at Mascat, *tamar* were being packed towards the end of July, while at Basra, picking of BRAIM *khalal* only began at the very end of the month. At Aden, on 13/8/20, the harvest of *khalal* was nearly over.

PLATE 27

Plate 27 shows fourteen *tamar*, seven *ratab*, and two *khalal* of AWAIDI dates. (Busfan, 13/9/19.)

The conversion of the *khalal* into *ratab* is sometimes hastened artificially on a small scale, by flagellating the former with the twigs of the prickly, and common, weed, *Alhagi maurorum* (A. *Algool*) or with those of some other spiny bush. They are then placed in a sunny place and covered with hot sand or earth. The resulting *ratab* are not of so fine a flavour as those which are allowed to ripen naturally.

HARVESTING.

Often the finest kinds of dates are picked singly from the bunch (A. *Ethig*) as they become *ratab*, and sometimes inferior dates are gathered in the same way, when as at Aden, dates of all kinds are scarce.

PLATE 28

PLATE 29

For the main date crop, however, the fruit is left on the palm until the majority is ripe, and then the bunches are cut. As a rule, all the dates of one variety in a garden are cut before the cutting of those of another variety is begun ; but sometimes in order to save labour, dates of several varieties are cut at the same time.

Helped by his *farweed*, the *fellah* climbs the palm whose dates are to be harvested and cuts off the bunches with a sharp pull towards him of his *minjail* or *sachin*.

Plate 28 shows the date harvest in progress. (Baghdad, 1918.)

The primary axis of the female spadix which the *fellah* cuts through is called *Asga*, and the technical term for the picker of fruit in general, and in particular for the cutter of date bunches, is *Jani*. If the dates are in the *khalal* or *ratab* stages, and hence liable to be damaged if dropped on to the ground, the bunches are stuck on the sharp arm of the *maglas*, a V-shaped piece of apricot wood, each arm of which is from one to two inches in diameter, and about eighteen inches long. To one arm is attached a rope made out of palm fibre. This instrument, loaded with three or four bunches of *khalal* or *ratab* is lowered to the ground where the bunches are removed. Then the *maglas* is drawn up to the top of the palm and the process repeated.

Most varieties of *tamar* are not damaged by a fall, and so the bunches are cut and thrown down to be picked up by *fellalia* (corrupt plural of *fellah*), technically known as *toowawish* (pl. of *towash*). In order to simplify this somewhat tedious operation, a *Bel* or reed mat is spread at the base of the palm and the *jani* tries to throw all the bunches on to the centre of it, but, as at the time the dates are cut, they are but insecurely fastened to their stalks, each of his movements shakes down some of the ripest dates all around the palm both on and off the *bel*. An improved *bel* was devised by the author, consisting of a circle of stout linen, twenty feet in diameter, supported by six bamboo ribs, each nine-and-a-half feet long. A circular gap one foot in diameter was left in the centre. This *bel* was made in two parts so that it could be fitted round the base of the palm. With this article half the time of picking up the dates was saved. However, the cost was thirty rupees, and the linen would not outlast one harvest, whereas a reed mat costs one rupee.

The dates are carried away from the palms and stacked in heaps in one part of the garden set aside for this purpose and termed *Jokhan*. They are carried in palm-fibre baskets called *Jella* (pl. *jilal*), or in *Rakook* (pl. of *Rak*), square baskets made of the mid-ribs (A. *Jarida*, pl. *Jaryid*) of palm fronds (A. *Saaf*, pl. *Saoof*). An ordinary *rak* holds about eighty pounds of loosely packed, ripe dates.

Plate 29 shows a *rak* carried by a *nagil* or carrier. (Daaiji, 9/9/19.)

It will have been observed from the foregoing that the labour used for date harvesting is of three kinds, the *jani*, the *towash*, and the *nagil*. In small gardens the garden *fellalia* do the work of all three, but in the bigger gardens the comparatively few permanent *fellalia* do the work of the *jonaa* (pl. of *jani*) and hired

labourers do the rest. There is a large influx of Persians and Arabs from the dateless regions to the Shat Al Arab at harvest time. Sometimes, too, men come from Hail to work for a short period and earn some money and then return.

The *fellalia* generally are paid a share of the total crop. If vegetables are grown in the garden one-eighth is a common proportion, for half the vegetables usually belong to the *fellah*. Where the palms are close together, and hence vegetable cultivation impracticable, then a fifth may be his share, and in some cases as much as a quarter is given. A *fellah* tends about two *Jaribain* (dual of *Jarib*, a

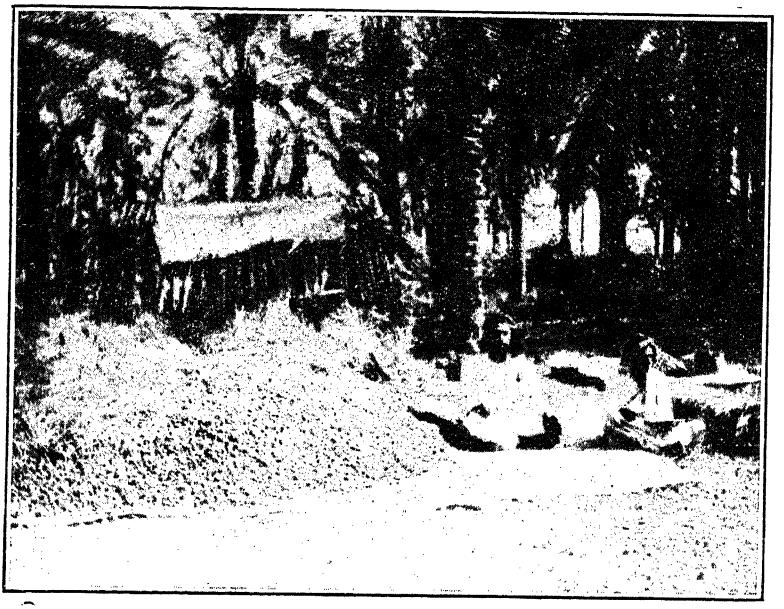

PLATE 30

measure of area, equivalent to about an acre) as a rule, though sometimes he may have charge of ten *joroob* or even more. As the conditions vary so much, it is not easy to ascertain the remuneration of the *fellah*, but supposing that he gets one-sixth of the crop, then, reckoning the average yield of dates at five thousand pounds an acre, and the average price at three hundred rupees a *Kara* of six thousand and forty-eight pounds, it would appear that the money value of dates received by the *fellah* at harvest amounts to about one hundred and sixty rupees. That is to say, he gets about eight annas a day throughout the year for attending to the date palms. If he is employed on the *taamir* or deep digging he is paid for this at the same rate

as other hired labour (see notes under Tillage), and provided he does not neglect the palms he is allowed to hire himself out to other garden owners for *taamir*.

The secondary products of the palm, the woody bases of the petioles (A. *Karib*, pl. *Kariboon*), the mid-ribs of the petioles (A. *Jarida*, pl. *Jaryid*), the fibre (A. *Lif*), etc., are divided in various ways between the garden-owner and the *fellah*. The former usually takes the greater share, and sometimes all except, perhaps, for a few fronds which he allows the *fellah* for building his hut.

The division of the harvest between the garden owner and the *fellah* takes place at the *Jokhan* after all the dates are cut. In the case of *Waqaf* and *Sania* land (religious trust and Crown land respectively), the authorities administering such property (the *Waqaf* and Revenue Departments respectively) also take a share, in some cases (vide page 23 of the Basra Wilayat Revenue Report for 1917-1918) before the division of produce between the owner and the *fellah* takes place, but in most cases from the owner's share only. The dates in the heap to be divided are shovelled into baskets which are emptied into the required number of heaps according to the number of shares required. The conclusion of the date picking is usually a cheerful matter, and much coffee is brewed and drunk.

Plate 30 shows a heap of HALAWI dates immediately before division. (Eusfan, 15/9/19.) They are covered partially by the empty bunches to prevent too much drying in the sun.

PROPAGATION.

The date palm may be grown either from a seed or from a sucker. The seedling does not breed true and the dates usually are inferior to those of the parent. Also, the sex may be different. Hence, commercially dates are not propagated by seed. The sucker, bud, or offshoot (A. *Farakh*, on the Euphrates, but on the Tigris *Tala*) appears on the trunk of the young palm near its base, below, or at the surface of the soil in the axil of a dead leaf base; and, if not cut, will become a full-grown palm where it stands. Several will sprout from the one palm, and eventually in place of one straight bole there will be a number of bent and jostling shoots. An excellent illustration of this is given in *The Date Palm and its Cultivation in the Punjab*, by Mr. D. Milne, 1918. On the Shat Al Arab, however, there is no such careless cultivation, and offshoots are removed when they are about four years old. The earth around them is dug away, their leaves are trimmed back, and they are severed from their parent by means of an iron chisel four feet long, called (on the Shat Al Arab) a *Sachin*. The trimming back of the *kariboon* close to the trunk of the palm generally kills the sucker buds, and hence that operation is deferred until the parent palm is about fourteen years old.

PLATE 31

PLATE 32

Plate 31 shows an exceptional offshoot, which has sprouted twelve feet from the ground from the top of a rather stunted, middle-aged KHADHRAWI palm. (Koot Adh Dhahi, 14/10/19.)

While discussing freaks in date palms, the branching KHASTAWI palm of Baghdad may be mentioned. There has been one branched date palm reported from India, but the present writer has heard of no others.

Plate 32 shows the branching palm of Baghdad (1918).

Plate 33 shows a small HALAWI *neshwa* on the left, and a larger HADAL *rabaiya* in the centre. (Jezira, 18/9/19.) The former has been trimmed only partially and bears two basal offshoots; the latter has been trimmed fully, but in spite of this bears an offshoot.

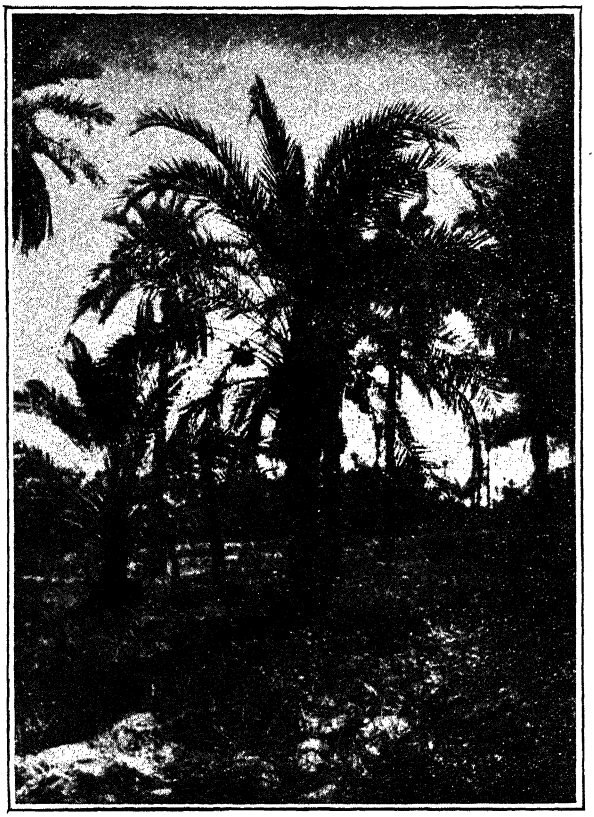

PLATE 33

The young shoot is planted, either between old palms, which eventually it will replace (*cf.* plate 7), or in hitherto unplanted land. Planting is regular. It is commonly stated by garden-owners that the maximum yield from *each* palm is obtained when palms are planted at the corners of squares whose sides are sixteen cubits (A. *Dhcrâa*) long, *i.e.* about eight yards. In other words, when palms are planted at the rate of about eighty to the acre, the yield of each is at its maximum. Actually palms are planted closer than this on the Shat Al Arab. It would appear that the average density in this area is about a hundred and twenty-five adult palms to the acre, *i.e.* the palms are planted at the corners of squares whose sides are seven yards in length. The figures collected by the author are not sufficiently complete for it to be stated definitely what number of palms of each variety to the unit area will produce the maximum yield; but it would seem that the average lies in the region of one hundred. The problem of obtaining the maximum profit from any area is somewhat different from that just discussed, because it may be more profitable

to grow comparatively few date palms together with one or more of the crops mentioned in the section headed Subsidiary Crops. This is the case in the Baghdad and Baqooba areas, where an orange tree seems to be more valuable than a date palm, at any rate during that period when both are in their prime. But the citrus trees do not flourish unless protected from the sun and wind by the palms, so most good gardens in these areas are made up of roughly half date palms and half orange trees. On the Shat Al Arab the water-level appears too near the surface of the ground for the orange to bear properly, and in this region an " all-date " garden is probably as profitable as a mixed one.

A medium-sized BARHI *farakh* costs from five to ten rupees in Basra. As much as twenty rupees may be paid occasionally for the rarer kinds. ISTAAMRAN at Basra and ZAHIDI at Baghdad usually can be bought for half a rupee. At Karbala (6/4/20), a hundred ZAHIDI were selling for sixteen *Majidi*, *i.e.* at the rate of six annas each.

4. MARKETING

General.

Dates are sold in the form of *khalal*, *ratab*, and *tamar*, but ordinarily dates in either of the two former stages of ripeness can be disposed of only if the market be near, for they are liable to spoil if carried long distances. The *khalal* of Braim and of Chibchab, on the other hand, which are cooked and dried, are much exported, and, as has been noted already, Khasab *khalal* also are often exported, but these arrive at their destination as *ratab*.

The choicest varieties generally are not sold, but are eaten by the garden-owner and his family, or fresh bunches of them may be distributed amongst his friends. Thus it is that such varieties as As-hag, Awaidi, Oom ad Dihin, etc., are not to be found either in the local bazaars or in foreign markets. Dates which are rare but not of outstanding merit are generally mixed with the main crop of the commoner varieties, because garden-owners do not wish to be bothered with small lots of fruit. Consequently exported dates are known by the names of the main varieties only. Thus the dates exported from Basra are of four main kinds :—

Istaamran, Halawi, Khadhrawi, Zahidi,

and in Northern Lower 'Iraq the export consists of :—

Zahidi, Khastawi, Khadhrawi.

It is the dates from Northern Lower 'Iraq which chiefly supply the Northern parts of Arabia, Syria, Northern Persia, and those from Southern Lower 'Iraq, the United Kingdom, India, the United States of America, Southern and Central Arabia, and the rest of the world.

Colonel Evans (13/9/18), in his preface to Capt. Buxton's *Report on the Failure of the Date Crop of Mesopotamia in* 1918, states that about two million one hundred and fifty thousand tons of dates ripen annually in 'Iraq, and that of this amount about ninety-seven per cent. is consumed locally. He omits to give the details of his procedure for arriving at these remarkable figures. If it be conceded that the population of the 'Iraq be somewhere about the frequently quoted figure of two-and-a-half millions, then, were Colonel Evans' figures to be correct, one would be forced to conclude that each man, woman and child in the country ate on the average about five pounds of dates a day. Five ounces a day is probably much too high an estimate.

The author is indebted to the kindness of Miss Sainsbury, of the India Office, for the following extracts from the Court Minutes of the East India Company, which refer to the export trade in Persian Gulf dates as early as the beginning of the seventeenth century :—

(*a*) In a letter from Thomas Rastell and others to the E.I.C., dated 14/2/1625, from aboard the " William," in Swally Road (O.C., Vol. 10, No. 1180),

" The ' Eagle ' surprised two Portugals, one a good ship and fit for their service, and in the other thirty-seven Arabian horses, dates, and Rohannas which were landed." . . .

(*b*) In a letter from Richard Barry to the E.I.C., March, 1631,

" Sailed for Persia . . . arrived there . . . and took in four hundred and eighty-eight frayles of dates to supply the company." . . . (Note.—The frayle is the Arabic " farsala," and varies locally, but seems to have been from twenty to thirty pounds.)

(*c*) Court Minutes, 18 and 22/11/1633,

" A parcel of dates laden in Persia for Surat wherein of two thousand frayles the Company had not above four hundred, Barry and others having culled out the best and for their own use sold them at good rates and put the refuse stuff upon the company."

Amount and Value of Export.

The Administration Report for 1919 of the Collector of Customs shows on page four of the second part the following figures :—

Value in Lakhs of Rupees of Export of Dates from the 'Iraq during the year 1919.

Destination.	*In Cases.*	*In Baskets.*	*Total.*
United Kingdom	111	0	111
India	39	34	73
United States and other countries ..	52	2	54
Arabia	12	11	23
Persia	1	1	2
Total	215	48	263

From this table it will be seen that the value of dates exported from the 'Iraq last year was about two-and-a-half million sterling, and of this amount (it is learnt from another table) a little more than two millions worth were exported through Basra. It is interesting to note the relative values of the five chief products of 'Iraq exported from Basra in 1919 :—

Dates	217	lakhs	of	rupees (*i.e.* 81 % of whole).
Grain	27	,,	,,	,,
Wool	15	,,	,,	,,
Hides	7	,,	,,	,,
Horses	2	,,	,,	,,
Total	268	,,	,,	,,

Owing to shipping difficulties, much of the 1918 date crop was exported with that for 1919, so that the figures given above (especially those for " cases ") are in excess of those which may be expected in a normal year. The following figures are adapted from those given in the above-quoted customs report (page 10 of the third part) :—

VALUE IN LAKHS OF RUPEES OF DATES EXPORTED FROM BASRA DURING THE YEARS 1910 to 1912 AND 1917 TO 1919.

Year.	*Dry Dates.*	*Wet Dates.*	*Total Dates.*	*Remarks.*
1910	48	15	63	Collated from Consular Reports. Rs. 15=£1.
1911	53	16	69	
1912	58	12	70	
1917	3	70	73	Custom's figures.
1918	1	40	41	
1919	2	217	219	
Total	165	370	535	
Average of the six years			89	

It is obvious from the above figures that the Consular officers of 1910 to 1912 and the Customs officers of 1917 to 1919 have different meanings for the terms " wet " and " dry " as applied to dates. The Customs officials presumably mean by " dry " dates " khalal matbookh " ; what the Consular officers meant is not easy to define.

It will be noticed that there is a discrepancy of two lakhs between the figures given on page three of the second part of the report and those on page ten of the third part.

In the book, *The Date Palm and its Cultivation in the Punjab*, by Mr. D. Milne, there is a table (No. 22) which shows the quantity and the value of the imports of dates into India during the four years 1910 to 1914. The figures presumably include imports from all countries; most, however, come from the 'Iraq.

IMPORT OF DATES INTO INDIA.

Year.	*Quantity in thousands of tons.*	*Value to nearest lakh of rupees.*
1910—1911	14	22
1911—1912	12	19
1912—1913	12	17
1913—1914	10	19
Average of the four years	12	19

Thus the average price of dates per ton on their arrival in India during the four years preceding the war was one hundred and fifty-eight rupees, which is equivalent to four hundred and twenty-seven rupees a *Kara*.

Page three of the second part of the 1919 Customs Report for the 'Iraq gives the following information; the 1919 export crop of dates from Basra was worth about a hundred and ninety-eight lakhs of rupees, and five-eighths of it (fifty thousand tons, valued at three hundred rupees a ton) was packed in about fifteen lakhs of cases and the remaining three-eighths (about thirty-two thousand tons, valued at a hundred and fifty rupees a ton) was packed in baskets. In 1918 the Deputy Director of Local Resources in Basra gave the author the following figures for the export of dates from Basra by sea during the previous season :—

SYER (*i.e.* ISTAAMRAN)	36,000	tons
HALAWI	25,000	,,
KHADHRAWI	15,000	,,
ZAHIDI	4,000	,,
Total	80,000	,,

The Customs Report gives the value of the dates exported from Basra in 1917 at seventy-three lakhs of rupees. Hence the ton value of dates in 1917 would seem to have been about ninety rupees, which is equivalent to two hundred and forty-six rupees a *kara*.

Dates in Basra are sold wholesale when in the *khalal* and *ratab* stages on the stalk by the *Man* of fifty-four *Hagga Stambool*. Each *Hagga Stambool* weighs approximately two and four-fifths pounds, so the *man* is equivalent to about one hundred and fifty-one pounds. The first BRAIM which are sold in the market may fetch twenty to thirty rupees a *man*, *i.e.* about three hundred and seventy rupees a ton. This is a very good price, because *khalal* dates are about twice as heavy as the same number of the same variety of *tamar* dates, and, further, the wood of the bunches is about fifteen per cent. of the gross weight. Fresh *khalal* on the bunch seldom drop below ten rupees a *man*, though at Hamdan, Shat Al Arab, on 11/10/19, KHASAB were being sold at nine rupees. At Seryji, Shat Al Arab, late in September, 1919, BARHI *khalal* were being sold at thirty rupees a *man*, and at the same place on 8/10/19 *tamar* of the same variety were selling at twenty-five rupees.

Tamar wholesale are usually sold by the *Kara* of forty *man*. The *kara* is equivalent to six thousand and forty-eight pounds, or about two tons and three-quarters. The price paid by the exporting merchants to the date growers ranges from about a hundred rupees a *kara* for the most inferior ISTAAMRAN or ZAHIDI to about five hundred for the best HALAWI. Two hundred to two hundred and fifty rupees a *kara* is, perhaps, about the average price paid for dates. Often superior dates of an inferior variety are sold at a high price. Thus in October, 1919, at Ajarawia, Shat Al Arab, some ZAHIDI were sold for four hundred and twenty rupees a *kara*. On 17/10/19, in Basra, the following prices ruled, HALAWI six hundred, ISTAAMRAN four hundred and forty, ZAHIDI four hundred to four hundred and twenty, all in rupees a *kara*. Equivalent prices in rupees a ton would be two hundred and twenty, one hundred and sixty-three, and one hundred and forty-eight to one hundred and fifty-six.

PACKING.

'Iraq dates are packed in :—

A. Sacks.
B. Palm-Leaf Baskets.
C. Skins.
D. One Pound Cartons.
E. Ten Pound Wooden Boxes.
F. Wooden Boxes containing Sixty-eight pounds net.

A. Sacks.

Sacks are used only for the dry *khalal matbookh* of BRAIM and CHIBCHAB. These dry BRAIM are to be found in all the main bazaars of the 'Iraq and in many of those of Northern India. In Meerut in 1917 they were sold at one pie each. At Marseilles, 23/8/20, what appeared to be dry CHIBCHAB were being sold at five francs eighty centimes the kilogramme, *i.e.* at the rate of exchange then prevailing, about three annas a pound.

PLATE 34

B. Palm-Leaf Baskets.

These baskets are called by the Arabs *Khăsāf*, pl. *Khăsăf*, or *Halana*, pl. *Halan*. The leaflets (A. *Khoosa*, pl. *Khoos*) are ripped from the dead fronds which have been cut from the palms and are woven into a strip of matting four inches wide and about fifty feet long. This strip is coiled in a spiral, and its edges are joined with thread of leaflet fibre, made by rubbing and twisting the leaflets until they separate into strong, fine threads. These baskets are about two feet wide at the bottom, but less at the top, and stand, when empty, about two and a half feet high. They are filled only about two-thirds full, and the top is folded down on to the dates and secured by a thread of leaflet fibre.

Plate 34 shows a *fellah* treading on ZAHIDI in a *khasaf* in order to pack them tightly.

As a rule it is only the cheaper varieties of dates which are packed in *khasaf*, *e.g.* ISTAAMRAN and ZAHIDI, though the other varieties, if for local consumption, are often packed in this manner. Nowadays all the dates for Europe and America are packed in boxes, though a few years ago dates in baskets could be bought in London. India, Arabia, and Persia take most of their dates in baskets.

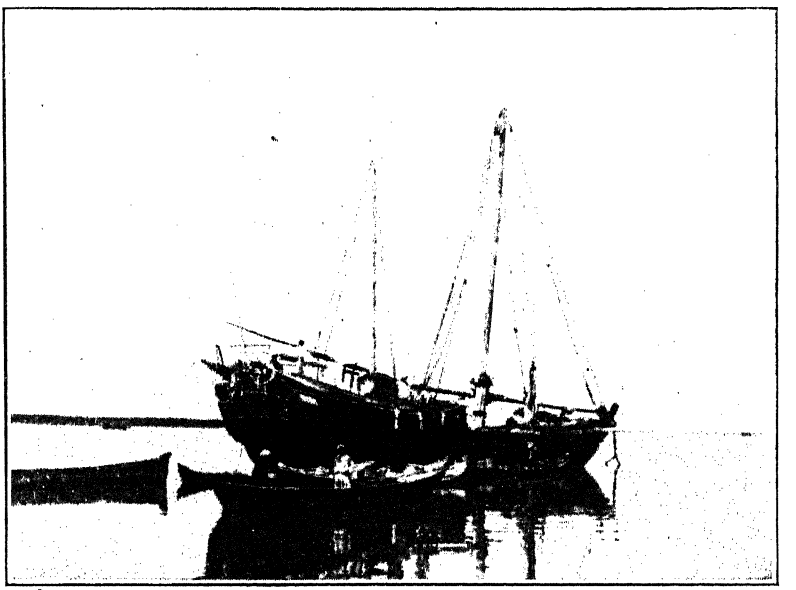

PLATE 35

Plate 35 shows an Arab, sea-going vessel (A. *Boom*, pl. *Boowam*) being loaded with baskets of ISTAAMRAN for the Arabian market through Kuwait. (Dora, 23/9/19.)

The Mascat date gardens are among the most important in the world, and they supply a large part of the Arabian and Indian demands. In many places in these two countries dates from both Basra and Mascat may be found side by side.

Plate 36 shows another method of transport—by camel. These animals were waiting outside Zubair to load up baskets of ISTAAMRAN to take them to Hail. (17/10/19.)

C. Skins.

In Northern Lower 'Iraq, where dates are not packed in boxes, and where sheep and goats are plentiful, the skins of these animals, if damaged and unfit for use as

PLATE 36

water skins, are sewn up with leather thongs and used instead of baskets for the packing of dates. A skin of dates weighs about fifty pounds. When the dates are retailed the leather usually is cut through with a sharp knife and sold with the fruit, so that skins once used for date packing are not refilled. Most of the dates which leave the middle Euphrates and Baghdad for the Central and Northern parts of Arabia are packed in skins.

D. One Pound Cartons.

A few of the biggest date exporting firms at Basra have recently started packing in one pound cartons a comparatively small quantity of KHADHRAWI *tamar*. Only selected dates are used, and the dried calyces are removed from them. For export usually sixty cartons are packed in a wooden crate. At Basra the retail price of

these cartons is three annas each, *i.e.* at the rate of one thousand one hundred and thirty-seven rupees a *kara*. In England (1921) the retail price of these cartons varies between sixpence and a shilling.

The dates which fetch the highest price in the English market are those from Tunisia and Algeria daintily packed in long, fancy cartons. Each contains about half a pound of dates with a date stalk laid down the centre, and sells retail in London (October, 1920) at about eighteen pence, *i.e.* at the rate of nine thousand and seventy-two rupees a *kara*. Dates are not packed in this particularly attractive manner in the 'Iraq, but it would seem that it might be profitable to do so. The distance from Basra to England is certainly much greater than that from Algiers to London, but excessive drying could be prevented by careful packing in oiled paper. The varieties which should be suitable for the best desert packing are :—

KHADHRAWI, HALAWI, BARHI, JOZI, etc., etc.	Southern Lower 'Iraq.
KHASTAWI, MAKTOOM, IBRAHIMI, HAMRAWI, etc., etc.	Northern Lower 'Iraq.

E. Wooden Boxes containing about Ten Pounds.

The Mesopotamia Persia Corporation, Ltd., have packed a small quantity of selected KHADHRAWI dates in ten pound boxes, chiefly for local sale and subsequent export to the United Kingdom by post.

F. Wooden Boxes containing Sixty-eight Pounds Net.

It is in this form that most dates are exported from Basra. As previously mentioned, about fifteen lakhs of cases are exported annually.

The sides, tops, ends, and bottoms of the boxes are imported from Scandinavia packed separately in wired bundles, and are nailed together after their arrival in the 'Iraq. The tramp steamers which bring the boxes arrive generally during July, and usually wait for a cargo of dates before leaving the port. In 1919 the price of each box, including that of labelling, by the time it arrived in Basra was two rupees and a half, which was much higher than it ever had been before, owing to the world demand for wood of all kinds and to the high shipping freights. The bundles are off-loaded into big, open, river craft (A. *Mahaila*, pl. *Mahailat*), and these are sent to the various packing stations (A. *Chardagh*, pl. *Charadigh*) situated on the edges of the bigger creeks and of the Shat Al Arab. Here the pieces of the boxes are nailed together, as shown in the following photo.

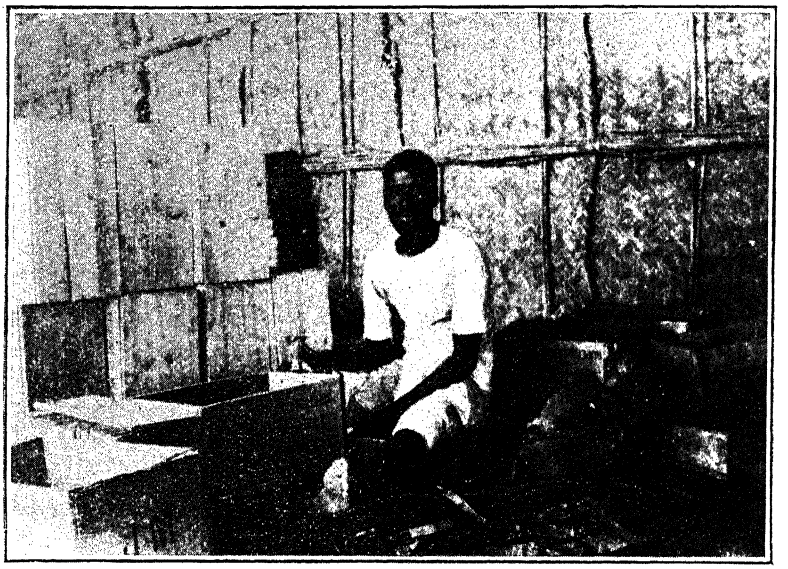

PLATE 37

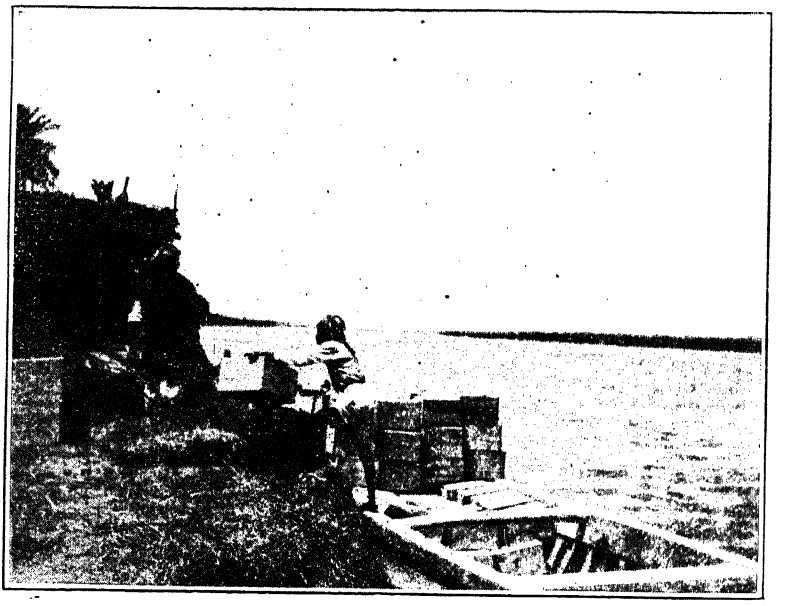

PLATE 38

Plate 37 was taken at Hamdan 9/9/19. The man shown was getting paid five rupees for every hundred boxes he made, and he was able to make about that number in a day.

The completed boxes, without their lids, are loaded on to small craft (A. *Chya*, pl. *Chyat*, or *Bellum*, pl. *Ablam*), and carried to each garden ; for most Shat Al Arab gardens are situated on, or very near, some waterway.

Plate 38 shows completed date boxes belonging to Jacob Marrow being loaded on to a large *bellum* at a *chardagh*. (Hamdan, 10/9/19.)

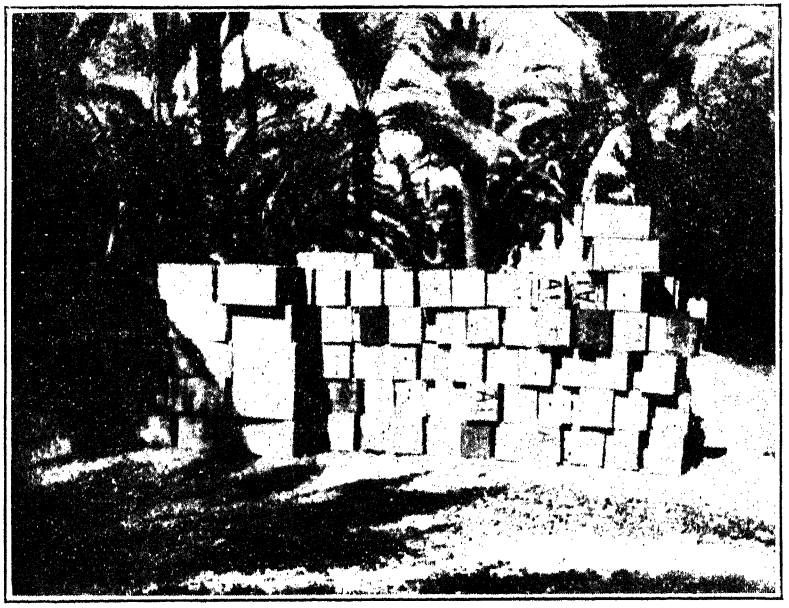

PLATE 39

Plate 39 shows date boxes belonging to Hills Brothers off-loaded in a garden at Eusfan (15/9/19), waiting to be filled with HALAWI dates.

Plate 40 shows HALAWI dates being poured straight from the basket in which they have been carried from the palm into boxes lying ready to receive them. (Eusfan, 15/9/19.) If the boxes are not ready for them, the dates are heaped and put into the boxes later.

When the boxes are as full as possible without undue squashing, they are returned to the packing stations, and their contents are emptied out into separate heaps according to the variety and condition of the dates in each box or in each

PLATE 40

PLATE 41

consignment. Often dates are brought into the packing stations loose in boats or in baskets.

At this stage the proper packing begins. Women, old men, and children, chiefly the first, squat on the ground in the shade of the reed mat awnings surrounding the open court-yards of the packing stations, and pack the dates by hand one by one, pressing each tightly against the other. When each layer has been completed the dates are pressed down by the weight of a man standing upon them. Between his

PLATE 42

feet and the dates is a stout board which fits exactly inside the boxes. The presser carries this board from box to box as he moves amongst the packers pressing where required.

Plate 41 shows a part of a packing station belonging to Shaikh Abd Al Wahab Bashayan. (Jezira, 28/9/19.) In the foreground are empty boxes, and in the background are women packing. For each box packed the packer receives two annas. An expert packer can pack sixteen boxes a day, but ten is the usual number.

Plate 42 shows a boy packing. (Jezira, 28/9/19.) He has moved into the sun for the purpose of having his photo taken; normally he would be sitting in the shade.

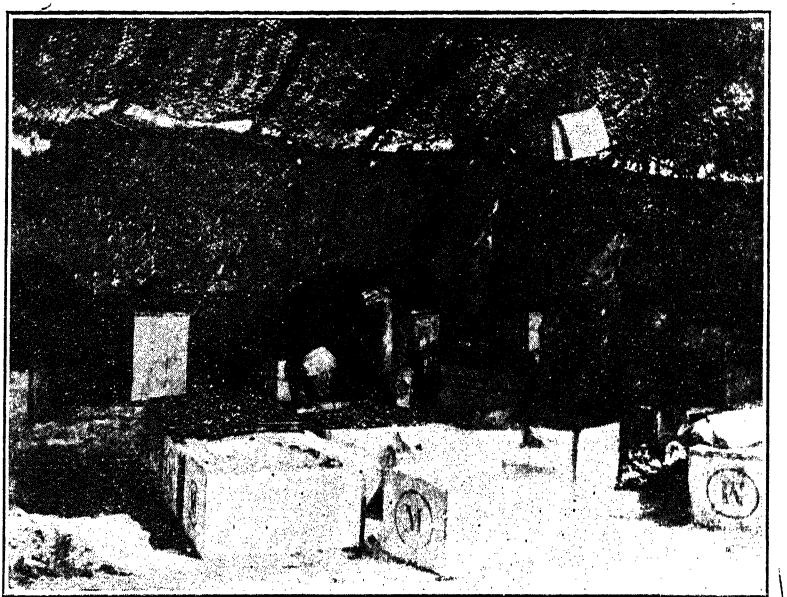

PLATE 43

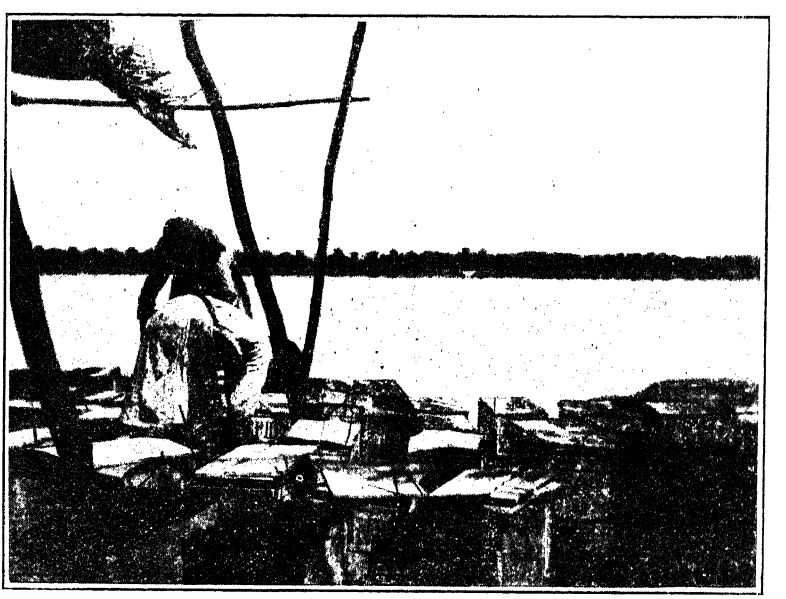

PLATE 44

Plate 43 shows in the foreground filled boxes of dates waiting to be carried away and closed up. (Jezira, 28/9/19.)

Plate 44 shows the lids being nailed on to the filled boxes. A sheet of white paper is placed on top of the dates and the lid on top of that. One man stands on the lid while another nails it down and secures the baling iron round the ends.

The labour employed in packing-stations consists chiefly of immigrants from the dateless parts of central Lower 'Iraq, and of Persians, Lurs, and Bakhtiaris, who

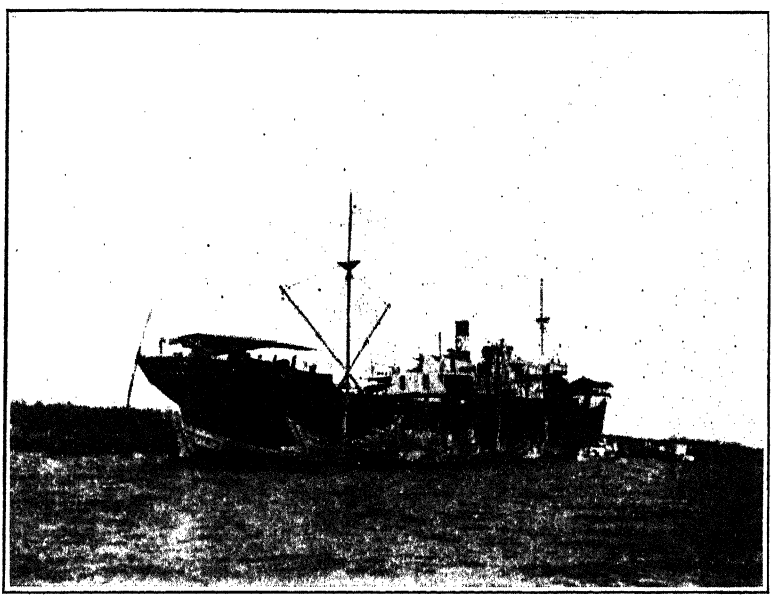

PLATE 45

come down from their hills for the packing season. The watchmen who guard the stations are usually Baloochis, whose inability to speak the language of the packers (Arabic and Persian) makes them particularly suitable for their position of trust.

Plate 45 shows a cargo boat loading dates from native craft lying alongside. (Shat Al Arab, 24/9/19.)

Export Trade in 1919.

The date export trade, though profitable, is somewhat speculative, because it is often necessary to advance money to garden owners and to packers a few months before the dates are sold on the world's markets. In 1919 the United Kingdom Food Controller fixed the London price at thirty shillings a hundredweight, but owing to the outcry from the 'Iraq, he eventually raised it to forty-two shillings and sixpence, *i.e.* equivalent to one thousand one hundred and fifty-seven and a half rupees a *kara*. The cost of packing, of freight, of insurance, and the exporters' profits together were reckoned to come to seven hundred and fourteen rupees a *kara*, leaving an average price paid to garden owners for their dates of four hundred and forty-three and a half rupees a *kara*.

Exporters and Packers.

The chief exporters of boxed dates are :—

	Box Mark.
The Mesopotamia Persia Corporation, Ltd...	
Hills Brothers	A.I. and a crown.
Strick, Scott and Co., Ltd.	T in a triangle.
Andrew Weir and Co.	
Jacob Marrow (also packs for Hills Brothers)..	J.M.
Garibian	
Bahjat Faraj	SPHINX.
Asfar and Co.	A. & Co.
Shaikh Abd Al Wahab Bashayan	S.A.B.

Though these firms have their own packing stations and make their own contracts direct with the garden-owners, and one or two have gardens of their own, yet most, in addition, employ agents to buy and pack for them, among which the following are the most important :—

	Box Mark.
Abd Al Jabar Khedhairi	M.N.
Gabriel Marine	M.
Faraj Marrow	ROSE.
Faraj and Jacob Marrow	F.J.M.
Faraj and Yoosef Marrow	F.Y.M.
Haji Mahmood An Naama	M.N.
Mohamad An Naama	M.N.
Talat Nasoori Khedhairi	A.J.K. and A.J.K. in double triangle.

	Box Mark.
Theodore	
Toma ibn Kadoori	T.K.
Yoosef Gara	V.G.
Yoosef ibn Abd Al Ahid (Packs for Stricks) ..	Y.A.M.

Unidentified box marks ..	A.W.Z.A.K.
	M.K.G.
	H.B.Co.
	F. & K.
	E.R.S.

On the end of each box is stencilled in black paint the letter S, H, K, or Z, standing for SYER (*i.e.* ISTAAMRAN), HALAWI, KHADHRAWI, or ZAHIDI respectively, according to the variety packed.

5. USES OF THE DATE PALM AND ITS PRODUCTS

A. The Palm.

Palms provide shade and shelter for fruit trees planted beneath them. Without some such protection oranges would get "Sun Burn," and the hot winds and sun of the middle of the summer would scorch and shrivel the other fruit trees as well. Apricot trees often die when there are not enough palms to protect them.

B. The Fruit.

The usual way in which *tamar* dates are eaten is uncooked, often together with unleavened bread (A. *Khoobaz*). There is, however, a variety of ways in which dates may be eaten. To the simple taste of the Arab, and indeed often to the more fastidious taste of the European, there are few more delicious dishes than Ibrahimi dates, date syrup (A. *Dibis*), and curds (A. *Roba*). Dates sometimes are cooked, but raw they are the more pleasant. Also a rather sickly jam is made of them. Cattle and horses are fed on dates occasionally.

Plate 46

From the fruit is distilled a spirit called *araq*. Factories for its preparation exist at Basra, Nasaria, Koot, Sook Ash Shaiyookh, in the Wilayat of Basra, and at Baghdad and other towns in the Baghdad Wilayat.

The old factory at Basra was of a primitive type ; the still was made of mud ; the fermenting vats were old casks ; and the buildings were made of reed mats. It was burnt down in 1918.

Plate 46 shows a general view of the old Basra factory, with its staff of Christians and Persians. (Aug., 1917.)

The Department of Local Resources had constructed a factory which, it was stated, was to be used for the production of methylated spirit. Shortly afterwards this factory was sold to a private company for the manufacture of 'Araq. The company has some European capital, is under European management, and the methods employed also are European.

The dates are soaked in water in fermenting vats until the sugar has become converted into alcohol. The proportion of sugar which is convertible to alcohol varies slightly in different varieties of dates. Of the commoner kinds, ZAHIDI contains most convertible sugar, and, as it is also the cheapest, it generally is used for 'Araq manufacture, though any very cheap and common date is used. Hence, at Basra, ISTAAMRAN is used more than ZAHIDI, but at Baghdad, ZAHIDI is used almost entirely. Dates which have been kept too long to be used as food are sold cheaply to 'Araq factories. Thus, the Basra factory was able to buy at a cheap rate a large quantity of dates which had become unfit for food while waiting to be shipped from Basra during 1919, as shipping was too scarce for all the 1918 crop to be disposed of quickly. Most varieties of dates, if properly packed, will keep for a year if they are in a dry store, but at Basra the available, suitable storage is not enough for more than a small proportion of the annual crop.

PLATE 47

After a few days the date liquor is strained off through sacks from the stones, skins, and thick liquor (which is distilled in an Irish still), and is then distilled in the modern still. There are added to the liquor mastic and caraway seeds, the former of which imparts a viscidity to the 'Araq, and both of which impart a flavour, the taste for which is acquired with difficulty, but once acquired is always required.

The resultant 'araq is colourless, slightly viscid, and with a taste not unlike kummel. It is much overproof, and has to be watered down. The price of the

liquor as put on the Basra market is twenty rupees a gallon (1918 to 1919). In Koot it is sixteen rupees, and in Amara twenty-two rupees.

At the Basra factory, the thick residue from the modern still and the thick residue from the vats are distilled in the old-fashioned *potteen* still, which, for this thick liquid, is the most suitable.

Plate 47 shows the Irish still. (17/9/19.) (1) is the still, and (2) the delivery pipe. Heat is supplied by a kerosene fire. (3) is the apparatus for storing the kerosene and forcing it out under pressure.

From the fruit also is obtained DATE SYRUP (A. *Dibis*). The fruit is heaped in mud-walled enclosures and the syrup is expressed from the lower dates by the weight of the other dates on top. One or more outlets are provided at the bottom of the enclosure (A. *Moodibsa*) through which the syrup runs into empty kerosene tins or other receptacles placed for it. Generally the floor of the enclosure is grooved in such a manner that the syrup is assisted to flow towards the exit, and occasionally also the floor is covered with hard pitch (A. *Jir*) so that no loss may occur through soakage.

Plate 48 shows a large *moodibsa* nearly full of ISTAAMRAN *tamar*. (Dora, 23/9/19.) Two outlets are provided and holes for the kerosene tins have been made immediately below the openings. The left-hand outlet and tin are covered with a mat to keep the dust from the syrup; the right-hand outlet and tin are uncovered. In the foreground are tins awaiting filling.

After being squashed in a *moodibsa*, and having lost some of their juice, the dates are not so good for eating as they were before. Nevertheless, they are packed, generally in baskets. ISTAAMRAN dates, being the commonest at Basra, generally are used for making *dibis*, but the choicer dates yield a more choice syrup and are occasionally used for this purpose. HALAWI syrup is three annas a pound dearer than that of ISTAAMRAN, and BARHI *dibis* is much dearer than this and is difficult to get. HALAWI, being comparatively dry dates, yield comparatively little syrup, and dates like ZAHIDI and BADRYA still less.

Vinegar also is made from dates.

C. DATE STONES.

(A. *Fasama*, pl. *Fasam*, or *Nooa*, pl. *Anwa*.) Date stones occasionally are collected from roads and gardens by urchins who sell them to charcoal makers. The resultant charcoal is suitable especially for the use of silversmiths. In parts of Arabia and of Northern Africa, date stones are ground and fed to camels and other stock. They are also used strung together as necklaces. In the 'Iraq, however, they are not so used.

PLATE 48

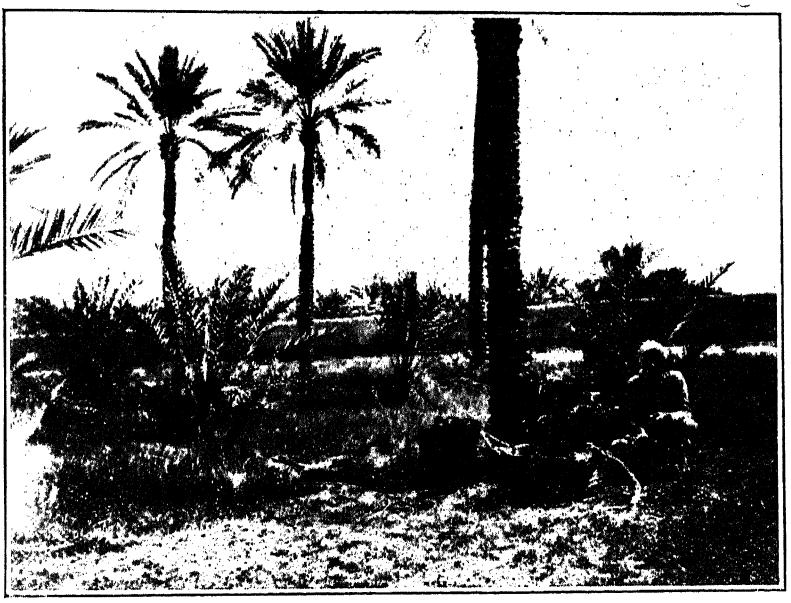

PLATE 49

D. Palm Trunk.

Palm trunks (A. *Jidhaa*, pl. *Joodhooa*) are used as timber in the construction of walls, roofs, palm bridges, embankments, steps, etc., and, when split into two and hollowed, they are used as water pipes and drains. They are also an important fuel in the date-growing districts.

Plate 49 shows, on the left, the stump (A. *Boros*) of a palm, and, on the right, the tied-up bundles of fire-wood (A. *Shilakh*) made out of its trunk. (Abool Khasib, 19/9/19.)

E. Heart.

The growing point (A. *Jumar*, *Yumar*, *Lib*, or *Qalb*) of the crown of the date palm is sweet, and when the latter is cut down the succulent growing-point is cut out and eaten. Coldstream states that the growing point in India is employed to make excellent curries. Curries, however, are not made in the 'Iraq. It is interesting to note that the Emperor Baber remarked on the sweet flavour of this part of the date palm.

F. Fibre.

The fibre (A. *Lif*) which surrounds the bases of the flower and leaf stalks is woven into an inferior rope. It is used also to enwrap the hearts of offshoots newly planted out to protect them from heat and cold. It is used as fuel, but it is chiefly known in the form of the bath *loofa*.

G. Fronds.

Date fronds (A. *Saaf*, pl. *Saoof*) are used for fuel, roofing, fencing, etc. At Moosaib in 1920 they cost one to two annas each. In Basra in 1919 a thousand Halawi fronds could be bought for twelve rupees, *i.e.* five for one anna. Istaamran fronds, being smaller, are cheaper.

Plate 50 shows a part of the wood market in Basra city, where complete fronds, frond bases and other products of the palm are exposed for sale.

H. Frond Midribs.

The leaflets are stripped from the fronds and the straight midribs (A. *Jarida*, pl. *Jaryid*) are used in the construction of a variety of articles—beds, chairs, cradles, bird-cages, etc., etc. When closely apposed they are used sometimes for roofing.

I. Frond Bases.

The chief use of the bases (A. *Karib*, pl. *Kariboon*) is for fuel. They are of convenient size, split up easily, and burn well. They are used also by fishermen as

floats, and by small boys learning to swim in the place of water-wings. For the last purpose HALAWI *kariboon* are suitable owing to their large size. In Egypt the broad leaf-bases (there called *Gahf*) are split up and used as brooms.

J. LEAFLETS.

As has before been noted, the baskets in which dates are packed are made entirely of date leaflets (A. *Khoosa*, pl. *Khoos*). The baskets (A. *Jella*, pl. *Jillal*) used in the market and for carrying dates from the palms to the packing shed, etc., are made of these leaflets rolled round a core of *Halfa* grass. Small mats, often the *bel* which is used to catch the dates thrown from the palms, are woven out of the leaves.

PLATE 50

K. FRUIT STALKS.

A rough rope is sometimes made out of the fruit stalks or primary axes of the spadices (A. *Ethig*, pl. *Ethoog*), but such ropes are used only for temporary work. Principally the fruit bunches are used as an inferior fuel. In Northern Africa the secondary axes (A. *Sharmookha*, pl. *Sharmookh*) of the spadices are laid in the small fancy boxes of dates in order to give the latter the appearance of still being on the stalk.

An old Tamil song enumerates eight hundred and one uses of the Palmyra palm (*Borassus flabellifer*, L.): the number of uses of the date palm and of the articles made from its products probably is but little short of this number.

6. DISEASES

The following list of date pests, which has been prepared in order to make more complete this brief note on date palms, has been read and corrected very kindly by Dr. P. A. Buxton, F.E.S., who has recently published a complete account of his investigations in date diseases.

Six pests have been found attacking 'Iraq date palms and fresh dates :—

Fungi.		A Saprophyte	1
Animalia.			
Arthropoda.			
Arachnida.		*Tetranychus*	2
Insecta.	Coccidae.	*Parlatoria blanchardi*	3
	Coleoptera.	*Oryctes*	4
		A Longicorn beetle	5
	Lepidoptera.	Gelechiidae	6

1. The Saprophytic Fungus.

This fungus was noticed on palm trunks at Badra by Major C. R. Wimshurst in April, 1920. He asserts that it weakens the palm, and thus makes it liable to blow down in a high wind. He suggests as preventive measures the leaving of plenty of space between the palms, and lime-washing their trunks. This disease is unimportant.

2. Tetranychus.

This mite was noted by Dr. Buxton in 1918. It is probably the species recently mentioned by Banks. Hirst, in The Proceedings of the Zoological Society of London, 1920, described it from Dr. Buxton's specimens. Early in July the red spiders spin over the date-clusters webs, in which dust collects, thus giving the disease its symptoms and its names, *Toz*, *Trab*, and *Maghabba*. The dates affected have a hard skin, and, as they never ripen properly, they are fed to cattle, or, if only slightly affected, they may be eaten by the poorest classes. Palms grown without sufficient water appear especially liable to attack. Khadhrawi is attacked often, Halawi less frequently, Zahidi and Istaamran comparatively seldom. Dr. Buxton says " it could be kept in check by cutting out the whole of the affected cluster early in the season and burning it. A paraffin and soap emulsion would be effective

also, but could be sprayed only on the lower palms. Arsenic, copper and lead obviously are contra-indicated owing to the fact that the Arab eats his dates uncooked and unwashed." This disease is responsible for much loss each year.

3. Parlatoria Blanchardi.

This grey scale was noticed and identified by Mr. D. G. Fairchild, United States Department of Agriculture, in 1900. It is common on the foliage of young palms, but less so on that of older ones. It does so little damage that the Arabs have no name for it.

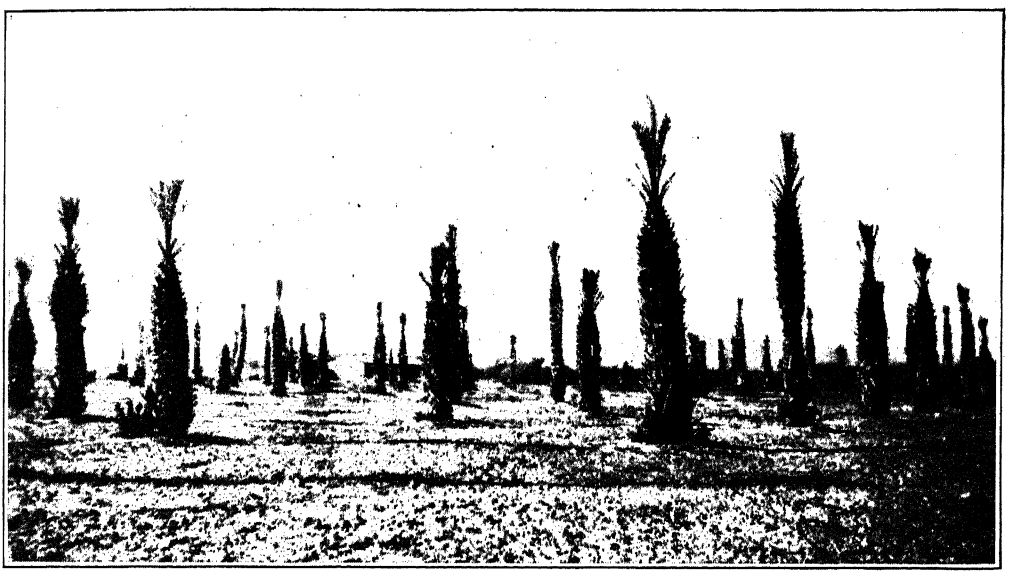

Plate 51

In Arizona, where considerable attention has been directed to date cultivation during the last thirty years, this scale appears to do a great deal of damage, and its control has been the subject of much study. After numerous experiments, Forbes, in 1913, devised the gasoline torch treatment, and found it very successful in exterminating *P. blanchardi*. Before *Phoenicococcus marlatti* could be destroyed, however, it was found necessary to cut off the old leaf bases right down to the trunk before applying the flame.

Plate 51 shows the effect of this treatment at Tempe (1920). It may be doubted if the disease can be worse than the cure.

4. Orycres.

This lamellicorn beetle, which was noticed first by Dr. Buxton in 1918, spends its larval life boring in the crown of the date palm. The larva is about two and a half inches long, and in some places occasionally is a serious pest. The Basra names of the larva are *Charnib* and *Gasoosa*, and at Baghdad it is called *Tadhooa* and *Khanfasana*.

Plate 52

5. The Longicorn Beetle Larva.

This larva was discovered by Major Wimshurst in 1920, who suggests that it is possible that it is the larva of *Priotyrranus moidax*. He states that it starts eating into the trunk of the palm through the fibre round the crown, and also through the green bases of the fronds. He recommends heavy lime washing at the end of winter. This pest has not been found to do much damage. It is, perhaps, the pest called by the Arabs *Aboo Mazerib*.

Plate 52 shows the effect of the ravages of this larva. About three feet below the feet of the *fellah* may be seen the large hole which has been made in the palm trunk.

6. Gelechiidae.

Tineid moths of the family Gelechiidae, whose species has not been ascertained, are the one really serious pest of 'Iraqi dates. They were studied by Dr. Buxton in 1918, and by Major Wimshurst and his assistant in 1919 and 1920.

The adult moth remains to be discovered, because all immature stages of this

species have died in captivity. The minute larva has been found in the inflorescence of a date palm immediately after its exit from the spathe. It generally is not noticed, however, until, by its activities, it causes the young, green date (A. *Chimri*)

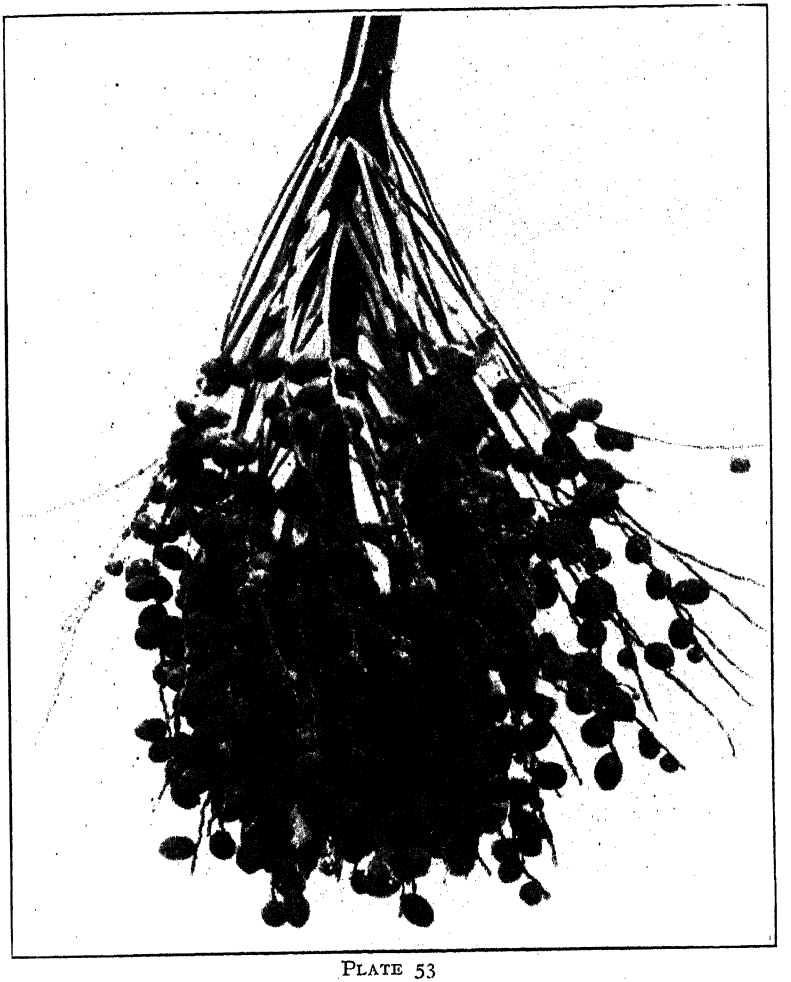

PLATE 53

to turn brown and to drop to the ground. On the earth around an infected palm lies a litter of small, spherical, dull red dates unfit for food or fodder. The larva cannot be found in a fruit which has dropped, but in the latter can be observed the exit hole with silk and frass projecting. The maggot may be seen if smaller dates which still are on the bunch and which have not become completely red be opened and explored. When very small the larva is a translucent white, but when full fed is opaque and pinkish.

Plates 53 and 54 show two bunches of dates, whose bigger dates are green and unaffected, but whose tiny, spherical ones are those which are, or have been, attacked by Gelechiid moth larvae.

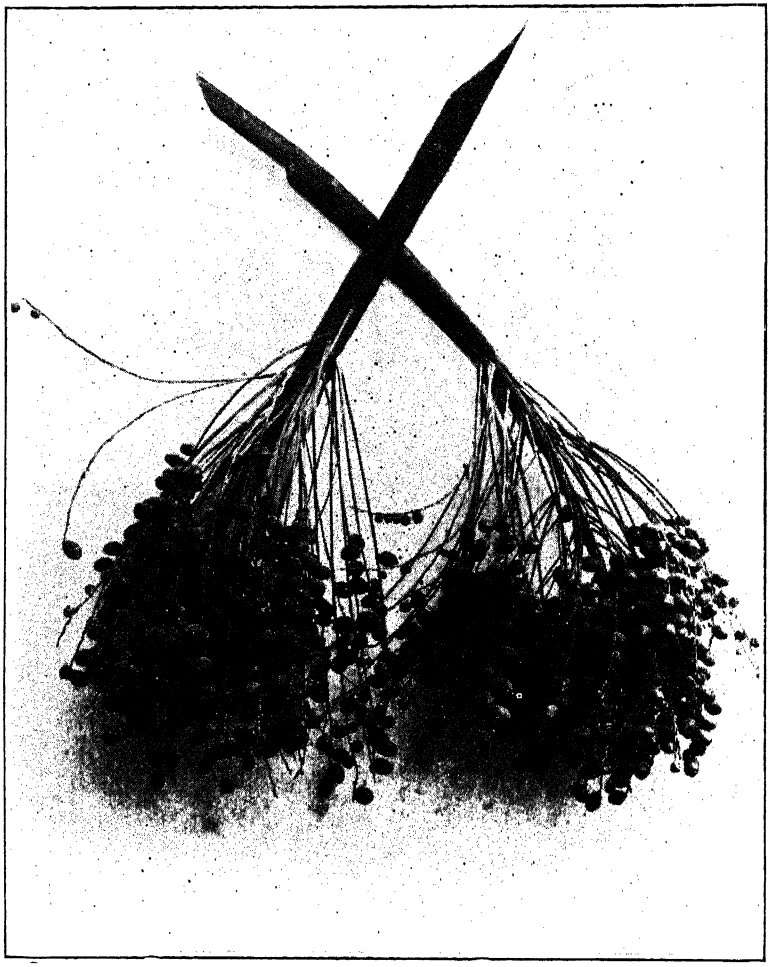

PLATE 54

Damage through the attacks of these larvae is considerable each year, and in 1918 it is estimated that a quarter of the whole date crop was lost through this cause.

The Arab names for this disease are *Hashaf* and *Hamera*.

Compared with many fruit trees, the date palm suffers but little from disease ; its one considerable enemy is the Gelechiid moth larva, against the ravages of which preventive measures yet have to be devised.

The stored fruit also, when tightly packed, suffers but little from insect pests, though loose dates, unless of the hard, dry varieties like ZAHIDI and ASHRASI attract various small moths and beetles, of the former of which *Ephestia* is an example. A large part of the 1918 harvest stored at Basra while awaiting shipment became weevilled by the summer of 1919, owing largely to the winter rains and floods having caused the boxes to burst and expose their contents to attack.

7. VOCABULARY OF DATE TERMS USED IN THE NOTE

(*Note.*—Long vowels underlined.)

Aboo Mazerib. A black, boring larva in bases of palm fronds.

Agool. *Alhagi maurorum,* " Camel thorn," a very common, small, wild bush.

Amoor. The diggers of the gardens. They work from early morning to mid-day, and get paid from one rupee four annas to two rupees.

Anag. The dried calyx of the date.

Anna. (H) One-sixteenth of a rupee.

Araq. An alcoholic drink distilled from dates.

Asga. Primary axis of female spadix, *i.e.* the main stalk of a date bunch.

Bakra. A water hoist, consisting essentially of a leathern bucket, which is pulled up over a pulley by animal power.

Bamia. *Hibiscus esculentus,* Ladies' Fingers.

Batikh. *Cucumis melo,* Sugar melon.

Batta (Yeman). *Syn. Ratab.*

Bel. The rush or date leaf mat placed at the base of the palm on to which the dates are thrown during harvesting.

Bellam. (pl. *Ablam.*) Long, narrow, shallow draughted punts, sharply pointed at both ends. Used on the Shat Al Arab chiefly for passenger traffic.

Benet. Rough rope made out of the primary axes of date fruit bunches.

Bis. The first spit in digging date gardens.

Bissa. A (date palm) spine.

Boom. (pl. *Bowam.*) A sea-going Arab sailing vessel with lateen sail.

Boros. The stump of a tree.

Charad. On the Tigris, called a *Bakra,* but on the Euphrates it consists of a pair of *bakra* side by side.

Chardagh. (pl. *Charadigh.*) A date-packing station.

Charnib. The larva of the beetle, *Oryctes,* which bores into the trunks of date palms.

Chesib. The dried ASHRASI date of the market in Baghdad; but in Basra, it is the dried BADRYA date which is meant.

Chibis. " Pressed " dates, *i.e.* dates in *Halan.*

Chimri. Small, green, unripe dates.

Chirian. Cleaning of old water channels.

Chya. A small Arab sailing vessel used on the 'Iraq rivers.

Dalia. A man-power water hoist.

Dhamin. Tenant.

Dharaa. A measure of length ; a cubit ; the distance from the elbow to the tip of the outstretched hand ; generally reckoned to be half-a-yard or half-a-metre.

Dhuman. Rent.

Dibis. Date syrup.

Digala. (pl. *Digal.*) Seedling date palm.

Dikh. *Syn. Sharmookha.*

Dimooa. The resin which sometimes exudes from the trunk of date palms.

Dooda. (pl. *Dood.*) General term for insect, worm, etc.

Ethig. (pl. *Ethoog.*) Spadix of female inflorescence.

Fahal. Male ; a male palm.

Farakh. Offshoot both before and after planting. On Euphrates called *Tala.*

Farwend. The supporting thong used in climbing date palms.

Fasama. (pl. *Fasam.*) Date stone. Often collected by small boys from roads, etc., and sold for charcoal making. Vinegar and syrup merchants often sell them for the same purpose. Their charcoal used by gold, silver, and tin smiths.

Fellah. (Corrupt pl. *Felalia.*) Agricultural labourer. He generally receives as wages a share of the crop.

Gaada. *Syn. Majlis.*

Gahf. Egypt. *Syn. Karib.*

Gasmool. The basal and stouter half of the palm frond after the removal of the apical half and of the leaflets and of the spines.

Gasoosa. One of the Basra names for the larva of the beetle, *Oryctes.*

Gishar. (*a*) Skin ; (*b*) the sheep or goat skin in which dates are packed ; (*c*) the skin of the date.

Gooma. Perianth.

Goosh. *Syn. Talaa.*

Gosera. *Syn. Halana.*

Hafriat. Digging of new water channels.

Hagga. (Anglicised into " Oke.") The *Hagga Stambool* is a measure of weight equivalent to about two-and-four-fifths pounds. The *Hagga Wilya* is equivalent to about nine-and-one-sixth pounds.

Halana. (pl. *Halan.*) Date baskets for export and for storage, made of date leaflets woven together.

Halfa. *Panicum. Sp.* A coarse, reed-like grass, used for fodder on occasion, also for rope and basket making.

Hamera. *Syn. Hashaf.*

Hashaf. (*a*) Small, dry, reddish dates which fall from the palms before maturity owing to damage by the larvae of a Gelechiid moth ; (*b*) the disease itself.

Hyla. Non-bearing female palm.

Jani. (pl. *Jonaa.*) A fruit picker, especially a *fellah* who cuts the dates.

Jaool. One of the boring beetle larvae.

Jarib. (pl. *Ajriba.*) Measure of area, used on the Shat Al Arab, of about one acre. Lieut.-Col. Gordon Walker (Revenue, Basra Wilyat, May 1918, page 6) says a *jarib* contains forty-two thousand seven hundred square feet, *i.e.* a square of sixty-nine yards sides.

Jarida. (pl. *Jaryid.*) Mid-rib of a palm frond. When made into beds called *Sarir.*

Jella. (pl. *Jilal.*) Big basket made of palm leaflets and *halfa* ; weighs from two to four pounds, and costs eight annas to one rupee.

Jidda. Any cooking pot in connection with dates ; the cooking pot in which *khalal* are boiled during the process of conversion into *khalal matbookh.* Some of the bigger pots hold five hundred pounds of BRAIM *khalal.* Also called *Toghar,* and sometimes (Turkish) *Kazan.*

Jidhaa. (pl. *Jodhooa.*) Trunk of a palm.

Jir. Pitch.

Jokhan. The place in each garden where the ripe dates are stored before they are sent to the packing stations. Its situation usually coincides with that of the *Majlis.*

Jumar. Sweet heart, or crown of palm.

Kara. A measure of weight, consisting of forty Basra *Man,* each of which contains fifty-four Stambool okes. Its weight, therefore, is equivalent to about six thousand and forty-eight pounds.

Karib. (pl. *Kariboon.*) Base of palm frond after removal from trunk. Used as firewood, floats, etc. In 1918 at Amara a thousand sold for about thirty-six rupees.

Karnoofa. The *karib* before removal from the palm.

Karra. Yeman term for *Khalal.*

Khalal. Second stage in the development of the date, generally yellow, but sometimes pink or yellow finely spotted with pink. Many varieties pleasant to eat in this form.

Khalal Matbookh. Cooked *khalal.* BRAIM dates often so treated. Resultant dates dry, hard, and sweet.

Khanfasana. One of the Baghdad names for the larva of the beetle, *Oryctes.*

Kharas. Estimate of a crop by eye. On the Shat Al Arab *waqaf* and *sania* lands are assessed by this method. *Moolak* land pays a fixed *jarib* tax.

Kharooa. Scarecrow.

Khasaf. *Syn. Halana.*

Khisa. Near Mohamera, a young palm with offshoots at its base. Elsewhere, an offshoot after planting out.

Khoobaz. Unleavened bread, the staple food of the 'Iraq.

Khoosa. (pl. *Khoos.*) Palm leaflet.

Khooshga. (pl. *Khooashig*). Dried *ethig*, used as fuel, etc.

Kookhsha. The second spit (in digging date gardens).

Laham. (*a*) Flesh ; (*b*) in connection with dates, the flesh thereof.

Lakh. (H.) One hundred thousand. Also spelt *Lac.*

Lib. *Syn. Jumar.*

Lif. Fibre round bases of palm fronds. Used for loofas, etc.

Ligah. Fertilization.

Loh. (pl. *Alwah.*) Flat (vegetable) bed, usually rectangular and seldom more than one hundred square yards in area.

Loobia. *Vigna Catiang*, Summer Bean, Blackeye Pea. Often grown as a subsidiary crop below date trees.

Maghabba. (*a*) Cobwebby ; (*b*) the webs spun by *Tetranychus* (red spider) over date clusters ; (*c*) the disease itself.

Maglas. The V-shaped, wooden instrument used for lowering to the ground bunches of dates which would be damaged by being allowed to fall from the top of the palm. To one end is attached a palm fibre rope.

Mahaila. (pl. *Mahailat.*) Big, open, river craft with one lateen sail.

Majidi. Turkish silver coin worth about two and a half rupees. Though no longer in circulation it is still used in accounts in N. & W. of the 'Iraq.

Majlis. Pleasant spot under the palms where the garden owner comes to sit, drink coffee, and to talk dates.

Makan. *Syn. Majlis.*

Malak. Owner, especially land-owner.

Malasi. Stoneless, unfertilized date.

Man. A measure of weight. Fifty-four Stambool okes in Basra, *i.e.* about one hundred and fifty-one pounds and four-fifths. In Baghdad twenty-four Stambool okes, and in 'Amara forty Stambool okes.

Maqata. In Basra, corresponds roughly to an English parish. In the rest of the 'Iraq a large estate generally farmed to a tribal shaikh.

Maqta. (*a*) A cutting ; (*b*) the pathway through a date garden.

Mardhoofa. In date gardens, the land between two small water channels.

Markadh. Yeman. *Syn. Farwend.*

Mash. *Phaseolus Mungo*, Green Gram. Often grown as a subsidiary crop in date gardens.

Matlaa. Egypt. *Syn. Farwend.*

Minjail. Small toothed Arab sickle. Used amongst many other purposes for cutting the fronds and date bunches from palms, more especially on the S.A.A. In the Baghdad district its place is, to some extent, replaced by the *sachin.*

Mis-ha. (pl. *Misahi.*) Arab, long-handled spade. The only tillage instrument used in the date gardens of the S.A.A.

Moodibsa. Mud (or, rarely, matting) enclosure in which dates are stacked in order that the weight of those on top may press out the syrup from those below.

Moolak Land. Corresponds very closely with English freehold land.

Nagil. (pl. *Nagala.*) A carrier. The bearer of the filled baskets of dates from the palms to the *jokhan.* Usually temporary, Arab, or Persian labour.

Nakhla. (pl. *Nakhal.*) Female date palm.

Naoor. A Noria. A Persian Wheel. A common apparatus for raising irrigation water.

Neshwa. Near Mohamera, a young palm which has stopped bearing offshoots, but elsewhere a young palm with offshoots at its base.

Nooa. (pl. *Anwa*). Fruit stone. May be applied to the date stone.

Pie. (H.) One-twelfth of an anna.

Qalb. Heart. *Syn. Jumar.*

Rabaiya. A middle-aged palm. A palm in its prime.

Rak. (pl. *Rakook.* Square basket of palm frond mid-ribs used for carrying dates. An ordinary one holds about eighty pounds of loosely packed dates.

Ratab. (*a*) Juicy; (*b*) the second stage in the ripening of the date. Soft, juicy dates between the hard, *khalal* stage and the toffee-like *tamar* stage. Generally brown or of dark colour.

Roba. Curds.

Rupee. (H.) A silver coin, the standard of Indian currency, and made the standard in the 'Iraq since the British occupation. Before the war, fifteen rupees were equivalent to one pound.

Saaf. (pl. *Sooof.*) Palm frond. Classically known as *Shalba.*

Sachin. (pl. *Sachachin.*) (*a*) Knife; (*b*) with reference to agriculture, the heavy, 7-shaped, smooth-edged sickle used for pruning date palms. Its use is confined almost to the Baghdad and Euphrates districts. On the S.A.A. this word refers to the four feet long, iron chisel with which offshoots are removed from the parent palm.

Salla. (pl. *Silal.*) Shallow, circular basket in which *ratab* dates often are marketed.

Samad. Manure. Generally consists of bazaar sweepings.

Samna. A small date palm spine. The diminutive of *bissa.*

Sania. Term applied to property owned directly by the Sultan of Turkey. Abd Al Hamid, when Sultan, possessed himself of some of the best land in the 'Iraq, but *Sania* date gardens are not always in good state, however, because their administration is in the

hands of agents who usually lack the interest which is characteristic of the man who owns his garden. *Sania* land is treated by the Civil Administration in the 'Iraq as *Miri* land, but it pays a higher rent. *Miri* land is Government property. Most land in the 'Iraq is of this description.

Sanjak. A division of the Turkish Empire very roughly corresponding to a county in England.

Sarir. Bedstead made of the mid-ribs of palm fronds, or the mid-ribs themselves.

Sharaba. (pl. *Sharabat.*) Woody spathe enclosing immature date palm inflorescence.

Sharmookha. (pl. *Sharmookh.*) Secondary axis of the female spadix of the date palm. A date stalk. Also called *Dikh.*

Shilakh. Firewood made by splitting up old date trunks.

Shish. Unfertilized date, small and *chimri*-like. Generally without stone when called *malasi.*

Shok. (*a*) *Prosopsis* (Sp. ?) Common leguminous plant with many small thorns ; (*b*) any thorns.

Shtib. *Syn. Loh.*

Silaiya. (pl. *Silla.*) A spine, especially those on date palms.

Simsim. (*Sesamum indicum* L.) Sesame. A subsidiary crop in date gardens (rare).

Sobat. *Syn. Majlis.*

Taab. Small hereditary tenant who pays his rent in kind. Usually poverty stricken and in debt and his garden badly cultivated. Generally to be found in *sania* and *waqaf* gardens. *Cf.* the *Ghair marusi* of the Punjab.

Taamir. The thorough, quadrennial digging of a date garden.

Tadhooa. One of the Basra names for the larva of the beetle, *Oryctes.*

Tala. Euphrates name for *farakh.*

Talaa. Male inflorescence of date palm.

Tamar. The third and last stage in the ripening of the date, usually toffee-like and dark coloured. The form in which dates are seen on foreign markets.

Tawila. Tall, old palm.

Thiara. Shallow, annual digging (of a date garden).

Toowash. (pl. *Toowawish.*) During the date harvest the person who picks up from the ground the dates as they fall or are cut from the palm.

Toz. Dust. *Syn. Maghabba.*

Trab. Dust. *Syn. Maghabba.*

Tyish. Dates which fall from the palm before the bunches are cut. They are collected daily and heaped. They are of inferior quality as a rule, and are possibly diseased, since diseased dates are generally those which first fall.

Waqaf. Religious trust property administered by the state.

Zabil. Small basket.

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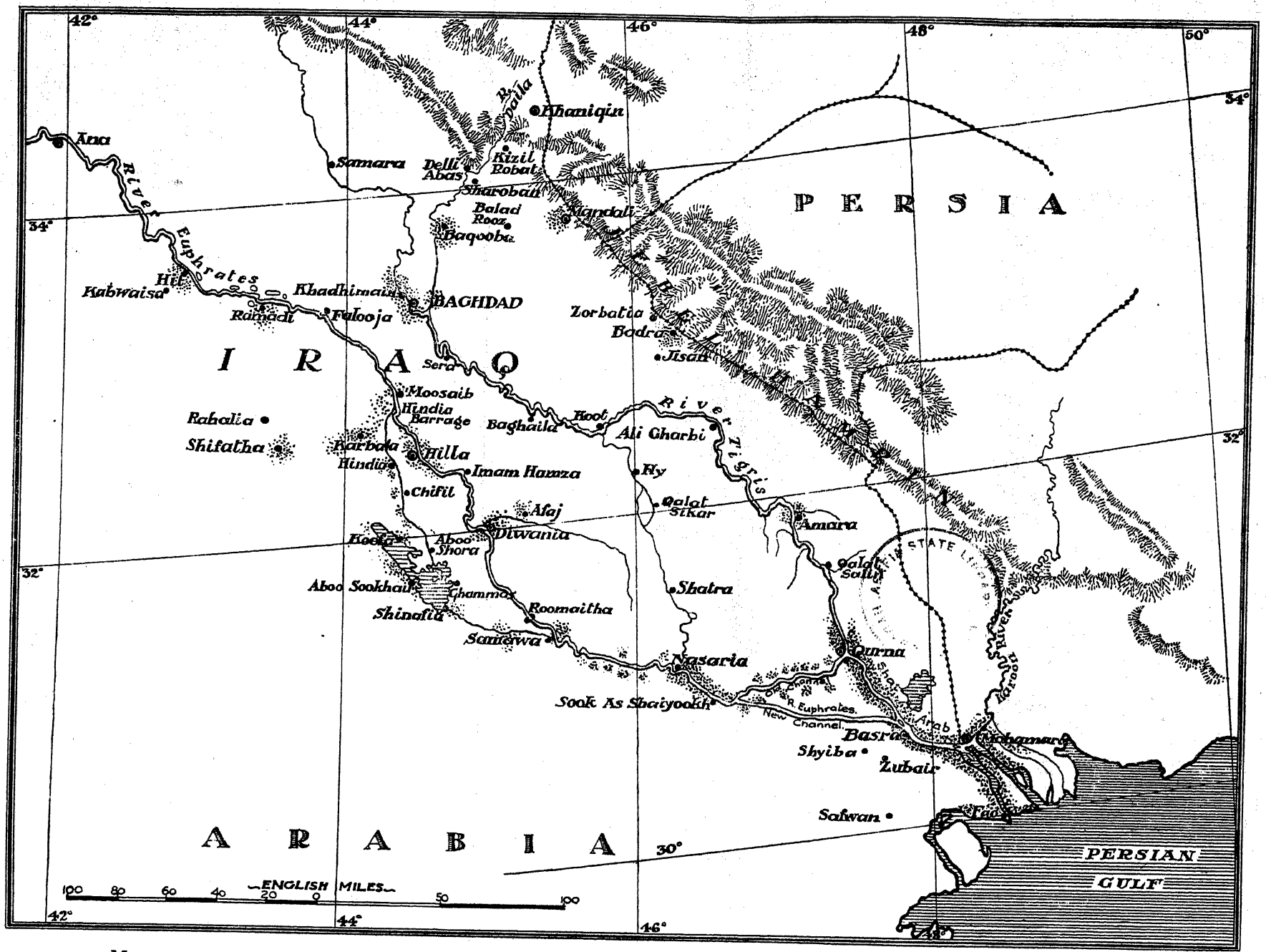

MAP SHEWING DISTRIBUTION OF DATE PALMS IN MESOPOTAMIA. DOTTED AREAS INDICATE DATE GROVES.
ONLY TOWNS WITH DATE GARDENS ADJOINING ARE INDICATED ON THE MAP.

Dates & Date Cultivation of the 'Iraq

BY

V. H. W. DOWSON

Agricultural Directorate of Mesopotamia

PART II.

The Results of an Investigation into the Yield of Date Palms on the Shat Al 'Arab

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FOREWORD

The following summary of an investigation into the yield of date palms has been compiled by the author from his detailed tables. These have not been considered of sufficient general interest to warrant their publication, but they may be consulted at the Offices of the Agricultural Directorate in Baghdad.

V. H. W. DOWSON.

TRINITY HALL, CAMBRIDGE,
1921.

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THE OBJECT OF THE INQUIRY

The primary object of the inquiry which the author undertook during the autumn of 1919 on the Shat Al 'Arab was that of providing reliable statistics of the average yield of dates per unit area with the view to discovering a broad basis for equitable taxation.

THE METHOD OF THE INQUIRY

Firstly, the average yields of the chief varieties of date palms scattered over the Shat Al 'Arab date lands were ascertained by actual weighings. Secondly, in several selected areas, nearly all of which were one-fifth of an acre in size, the number of each variety of date palm, and of other fruit trees, if any, was recorded.

The individual yields of dates from nine hundred and thirty palms belonging to nineteen different varieties were weighed. These palms were situated in thirty-six different gardens scattered over fifteen different *maqata* (*i.e.* parishes) of the Basra *sanjak* (*i.e.* county). It was proposed to weigh the dates from at least fifty palms of each variety, but in the case of most of the rarer sorts this was not possible, because either this number of palms was never found at all, or else, when found, their dates either had been cut or were unripe. To discover the minimum number of palms of any variety the yield of which must be weighed in order to arrive at the average yield in any particular year is a matter which must be reserved for some future harvest. Meanwhile, it is reasonable to assume that the average yield of fifty palms of the same variety, widely scattered over the Shat Al 'Arab date lands, is sufficiently accurate for purposes of revenue assessment. On this assumption the average yields that have been computed from actual weighings for the following six varieties may be accepted :—ISTAAMRAN (379), HALAWI (150), KHADHRAWI (116), ZAHIDI (52), BRAIM *Khalal* (60). The numbers in brackets refer to the numbers of palms whose yields were weighed. The average yields of the following must be accepted with caution :—DIGAL (39), GANTAR (37), DAIRI (36), BARHI (20), SHOOKAR (12), KHASAB *Khalal* (12). The number of weighings was so small in the case of the remaining varieties that the records cannot be accepted as bases for computing the average yields of those varieties.

In eighty-four areas, nearly all of which were exactly one-fifth of an acre in size, situated in thirty-nine gardens in sixteen different *maqata* scattered over the Basra *Sanjak*, the frequency of each kind of date palm and of each variety of fruit tree was ascertained. Thus it was possible to discover the average number of each variety of date palm and of fruit tree per unit area. A very large number of determinations would have been necessary in order to determine the degree of accuracy obtained in these results, but time would not permit of this being done. It is permissible to assume, however, that the records are sufficiently accurate for the purpose for which they were compiled.

By combining the results of both parts of the inquiry, that is the yields of each variety of palm and their frequency per unit area, it is possible to form an estimate of the average yield of dates per acre.

TABLE 1.

SHAT AL 'ARAB VARIETIES OF FEMALE DATE PALMS

SHOWING THE STATE IN WHICH THEY WERE WEIGHED.

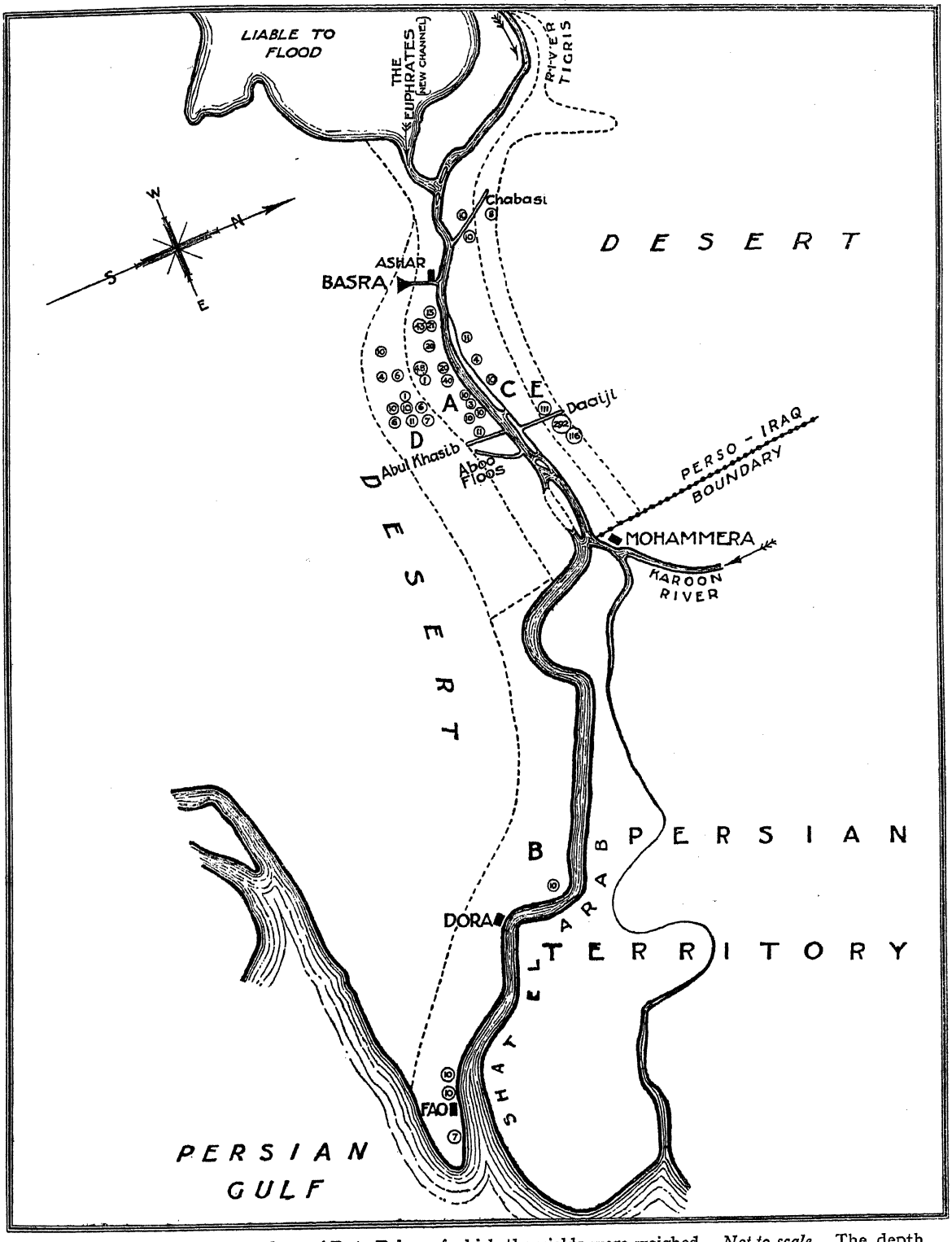
Names of varieties, the dates of which were weighed.			Names of vars. identified, but not weighed.	Names of vars. reported present, but not identified.
Khalal	*Ratab*	*Tamar*		
1	2	3	4	5
BRAIM	ASHRASI	AWAIDI	ASABIAT AL AROOS	ATRI
KHASAB		BRAIM	AS-HAG	BINT AS SABA
LILWI		BARHI	ASHGAR	BARBAN
		CHIBCHAB	BOBAK	KHASTAWI
		DAIRI	DAAILI	MIDAD
		DIGAL	DIGAL ABAS	OOM AL BAKHOOR
		DIGAL JEMA	DIGAL ABD AL ALI	SHWAIDI
		DIGAL MOOSA	DOOWAICH	SIKARI
		GANTAR	FARSI	TABARZAL
		HABSI	HADAL	
		HALAWI	HAMRAWI	
		HELYA	HASAWI	
		ISTAAMRAN	HAWAIZ	
		KHADHRAWI	JOZI	
		SHOOKAR	KHINAIZ	
		ZAHIDI	KHLAS	
			MAKTOOM	
			NOOKSH AL MABRID	
			OOM AD DIHIN	
			SHIRANI	
			SWAIDAN	
3 Vars.	1 Var.	16 Vars.	21 Vars.	9 Vars.

Total varieties, 50.

THE DISTRIBUTION OF GARDENS IN WHICH DATES WERE WEIGHED AND OF THOSE IN WHICH THE PALMS AND FRUIT TREES WERE COUNTED.

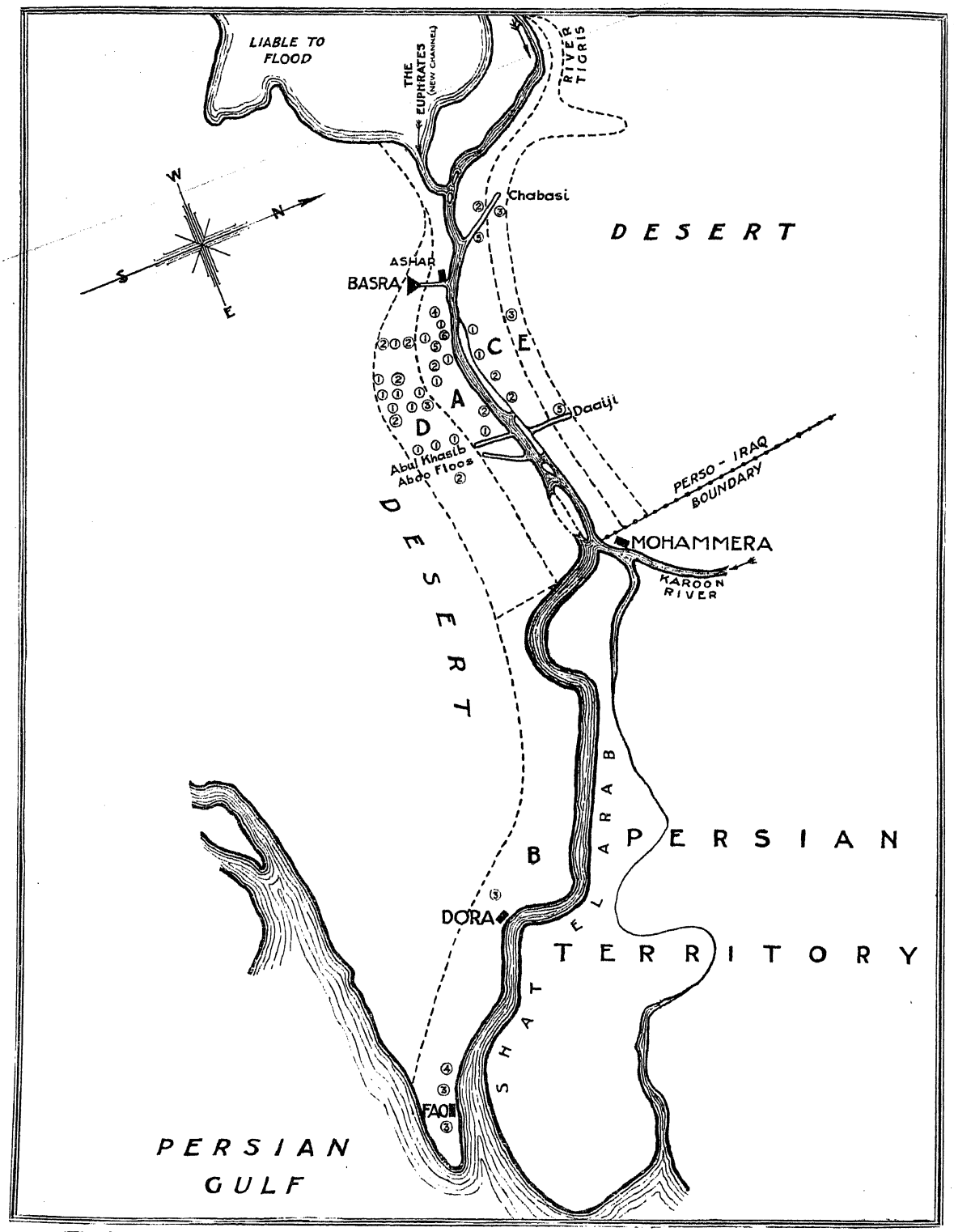
Maqata.	Number of Gardens in which Dates were weighed.	Number of Plots in which palms and fruit trees were counted.
AREA A. (Right bank. Basra to Mohamera Within half-a-mile of river.)		
Abool Khasib	1	1
Aboo Maghira	2	2
Eusfan	4	3
Hamdan	0	1
Koot Adh Dhahi	1	4
Koot Al Jooa	0	1
Mahaijaran	1	0
Saryji	2	12
Yahoodi	2	0
Total	13	24
AREA B. (Right bank. Mohamera to Fao.)		
Dora	1	3
Fao	3	10
Total	4	13
AREA C. (Left bank. Nahr Amar to Mohamera. Within half-a-mile of river.)		
Ajarawia	3	6
Chabasi	1	5
Jazira	1	2
Total	5	13
AREA D. (Right bank. Basra to Mohamera. More than half-a-mile from river.)		
Abool Khasib	0	3
Eusfan	0	2
Faiya	0	2
Hamdan	7	10
Koot Ath Thwaini	2	1
Mahaijaran	1	5
Total	10	23
AREA E. (Left bank. Nahr Amar to Mohamera. More than half-a-mile from river.)		
Ajarawia	0	3
Daaiji	3	5
Jezira	1	3
Total	4	11
Total Whole *Sanjak* ..	36	84 (*contained in* 39 *different gardens*)

SHOWING APPROXIMATE POSITION OF GARDENS IN WHICH DATES WERE WEIGHED.



(The figures indicate the numbers of Date Palms of which the yields were weighed. *Not to scale.* The depth of the Palm Belt is exaggerated.)

SHOWING APPROXIMATE POSITION OF GARDENS IN WHICH DATE PALMS AND FRUIT TREES WERE COUNTED.



(The figures indicate the number of separate plots surveyed in each garden. *Not to scale.* The depth

NOTES TO SKETCH MAPS I. & II.

It will be seen that the 'Iraq territory in the Shat Al 'Arab date zone has been divided into five areas, A, B, C, D and E. Within half-a-mile of the river, as a very general rule, palms seem to be more flourishing than those further away; the left bank of the river, as far south as Mohamera, is newer soil than the right bank; near Basra there seems to be a greater number of fruit trees per unit area than elsewhere; on the edge of the desert palms are less dense than near the river. These were the reasons that made it seem desirable to divide the district into smaller areas.

From Map I. it may be seen that the majority of gardens in which dates were weighed were situated on the right bank of the Shat Al 'Arab between Basra and a point opposite Mohamera (*i.e.* in areas A and D). It is here that the date belt is widest and the density of the palms the greatest of all the Shat Al 'Arab date lands. This is the most valuable date land in the world.

From Map II. it may be seen that the greatest number of plots surveyed were also in areas A and D, and, hence, greater reliance may be placed on the records of density obtained in these areas than on those from the remaining areas.

REMARKS EXPLANATORY OF TABLES III. TO VI.

The STATE in which the dates were weighed was *Khalal, Ratab,* or *Tamar.* That is to say, "Hard and juicy," "Soft and squashy," or "Dry and toffee-like." These terms have been explained in detail in Part I. of this note; they denote respectively the second, third, and fourth (last) stage in the process of ripening of the date. In the majority of cases the *tamar* stage is the only commercially important form of the date. The chief exception is that of the variety BRAIM. When dates were weighed in either of the two former stages they were weighed on the bunch, and hence the weight of the wood (approximately 15 per cent. of the gross weight) is included in the figures recorded, but all *tamar* dates were weighed after separation from the bunch.

The VARIETY of the dates has been given in each case.

The NUMBER OF PALMS has been stated also. Where the yields of only one or two palms of any particular variety have been recorded, it is not possible to place any reliance on the average figures given for that variety, but in those cases in which a large number of determinations have been made it is to be expected that the figures noted for the average yield are fairly accurate.

In the column AGE OF PALMS, palms have been designated A, B, or C. A is a *Neshwa,* B a *Rabaiya,* and C a *Tawila.* These terms have been explained fully in Part I. A *Neshwa* is a palm not yet in full bearing, a *Rabaiya* is a mature palm in its prime, and a *Tawila* is a tall and old palm which is past its period of optimum bearing. In actual years A might be anything from five to thirty, B from twelve to sixty, and C from thirty to a hundred or more.

THE TOTAL NUMBER OF BUNCHES has been recorded, because the literature of dates seems to contain little information concerning the number of fruit bunches borne on date palms; and to supply this omission entailed but little extra work when the yields were being found.

The TOTAL WEIGHT OF DATES IN POUNDS is the sum of the weights of dates of all the palms of each variety whose yields were weighed. The dates were weighed in a basket suspended from a new spring balance weighing up to a hundred pounds by half pounds. The weights are accurate to the nearest pound.

TABLE III.

CONSOLIDATED STATEMENT OF DATE WEIGHINGS.

State of Dates when weighed.	Number of Palms.	Age of palms. A	B	C	Number of bunches.	Weight of Dates in lbs.	Average Number of Bunches per Palm.	Average Weight in in Pounds of Dates per Palm.
Khalal	75	9	34	32	517	4,710	7	63
Ratab	4	0	4	0	28	245	7	61
Tamar	851	167	348	336	5,983	35,700	7	42
Total	930	176	386	368	6,528	40,655	7	44

TABLE IV.

ALL WEIGHINGS OF DATES IN *KHALAL* STAGE.

Variety	Number of Palms.	Age of Palms A	B	C	Number of Bunches	Weight of Dates in lbs.	Average Number of Bunches per Palm.	Average Weight in Pounds of Dates per Palm.
BRAIM	60	9	30	21	406	3,793	7	63
KHASAB	12	0	3	9	90	775	7	65
LILWI	3	0	1	2	21	142	7	47
Total *Khalal*	75	9	34	32	517	4,710	7	63

TABLE V.

ALL WEIGHINGS OF DATES IN *RATAB* STAGE.

Variety	Number of Palms.	Age of Palms A	B	C	Number of Bunches.	Weight of Dates in lbs.	Average Number of Bunches per Palm.	Average Weight in Pounds of Dates per Palm.
ASHRASI	4	0	4	0	28	245	7	61

TABLE VI.

ALL WEIGHINGS OF DATES IN *TAMAR* STAGE.

Variety.	Number of Palms.	Age of Palms			Number of Bunches.	Weight of Dates in lbs.	Average Number of Bunches per Palm.	Average Weight in Pounds of Dates per Palm.
		A	B	C				
AWAIDI	4	0	0	4	28	72	7	18
BRAIM	1	0	1	0	11	42	11	42
BARHI	20	0	20	0	176	1,934	9	97
CHIBCHAB	1	0	0	1	7	25	7	25
DAIRI	36	10	11	15	272	1,143	8	32
DIGAL	39	14	15	10	214	745	5	19
DIGAL JEMA	1	0	0	1	12	93	12	93
DIGAL MOOSA	1	1	0	0	5	2	5	2
GANTAR	37	2	1	34	190	631	5	17
HABSI	1	0	0	1	7	25	7	25
HALAWI	150	32	78	40	945	6,556	6	44
HELYA	1	0	0	1	11	65	11	65
ISTAAMRAN	379	60	134	185	2,759	13,898	7	37
KHADHRAWI	116	39	47	30	669	3,472	6	30
SHOOKAR	12	0	1	11	88	470	7	39
ZAHIDI	52	9	40	3	589	6,527	11	126
Total *Tamar*	851	167	348	336	5,983	35,700	7	42

FACTS APPARENT FROM TABLES III. TO VI.

Firstly, it will be noticed that the average yield of 930 date palms widely scattered over the Shat Al 'Arab date lands was, in the year 1919, 44 lbs. Since the number of palms whose yields were ascertained was so large, this figure may be accepted as the average for the season.

Secondly, the average yield of the 851 palms the dates of which were weighed in the *tamar* stage was 42 pounds.

Thirdly, the average yield of *tamar* dates of each of the five most common varieties was :—

ISTAAMRAN	37	lbs.	per	palm	(379	palms)
HALAWI	44	,,	,,	,,	(150	,,)
KHADHRAWI	30	,,	,,	,,	(116	,,)
DAIRI	32	,,	,,	,,	(36	,,)
ZAHIDI	126	,,	,,	,,	(52	,,)

Diagram No. 1 illustrates this.

Fourthly, it will be seen that on the average six pounds of *tamar* dates are borne on each bunch, and that the average number of bunches that is borne by each palm is seven. The figures for those varieties of which most weighings were made are given in Table VII.

DIAGRAM I.

SHOWING AVERAGE YIELD OF *TAMAR* DATES PER PALM OF THE FIVE CHIEF VARIETIES.

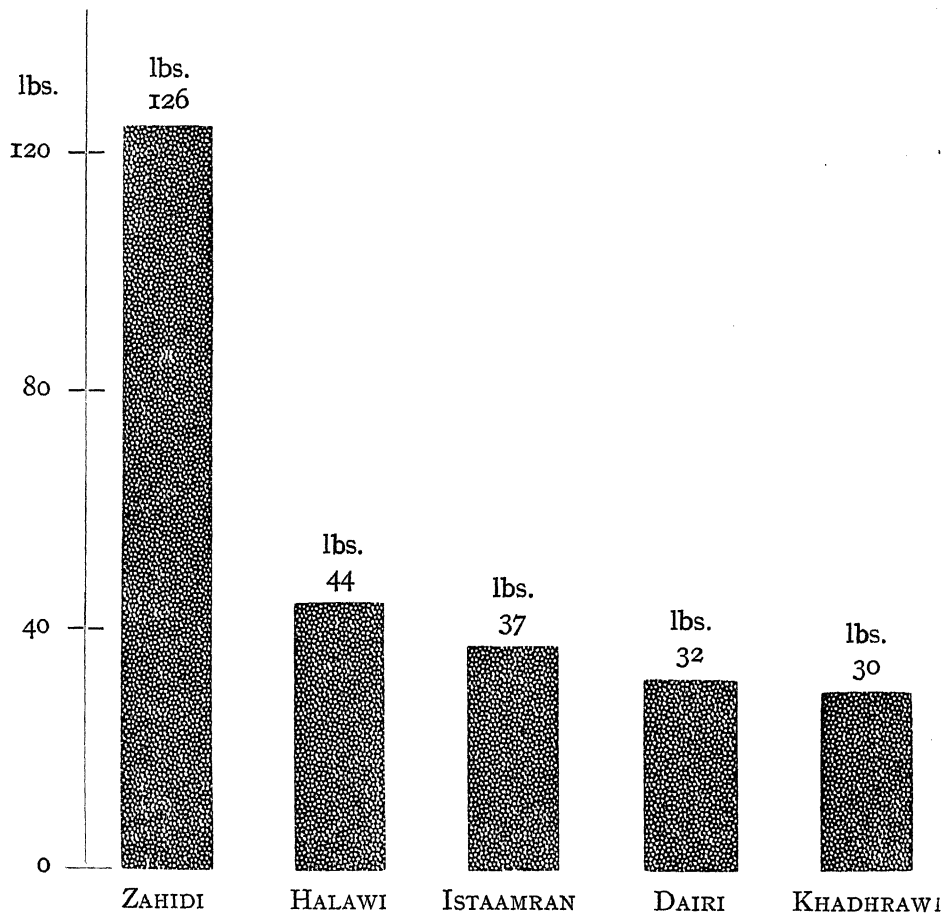


TABLE VII.

SHOWING AVERAGE WEIGHTS OF *TAMAR* DATES PER BUNCH.

Variety.	Number of palms.	Average Number of Bunches per Palm.	Average Weight in lbs. of Dates per Palm.	Average Weight in lbs. of Dates per bunch.
ISTAAMRAN	379	7·3	36·7	5·0
HALAWI	150	6·3	43·7	6·8
KHADHRAWI	116	5·8	29·9	5·2
ZAHIDI	52	11·3	125·5	11·1

REMARKS EXPLANATORY OF TABLES VIII. TO XIV.

Tables VIII. to XII. (inclusive) show the relative frequency of all palms and fruit trees in AREAS A, B, C, D, and E respectively. Table XIII. shows the average relative frequency of all varieties of date palms in all these areas; and Table XIV. shows the average relative frequency of date palms and all fruit trees in these areas. The reasons for artificially dividing the date lands into five zones have been stated already. On the right bank, between a point opposite Mohamera and Fao (that is to say Area B), the depth of the palm belt from the river is much less than it is nearer to Basra, and hence it has been considered unnecessary to subdivide it. The corresponding area on the left bank is Persian territory, and was not visited.

In order to obtain results as far as possible comparable with each other, each plot in which the palms and fruit trees were counted was selected with one side along a path and one adjacent side along one of the smaller irrigation channels. Since most gardens are planned squarely, this was generally possible. Each side was 31 yards long in 76 of the plots. In four of the plots, however, the area was greater than one acre. In three of the plots the area was one acre; and in one plot the area was three-quarters of an acre. The actual figures recorded for each plot have been converted in the tables into figures per acre.

The names of the GARDEN OWNERS and of the TENANTS, if there were any, have been recorded in order that it will be possible for the gardens to be found by subsequent investigators, if necessary.

It had been noticed that the densest gardens seemed to be those in which the cultivation was the most thorough. In order to bring further light on this point, the cultivation that each plot appeared to be receiving was noted as GOOD, FAIR, or BAD. By GOOD cultivation was meant such cultivation described as that practised in the best gardens of the Shat Al 'Arab in Part I. of this note. Such gardens are trench dug every four years to a depth of three or more feet, and in the intervening years are dug shallowly. Gardens described as BAD were those which had not been cultivated for several years. FAIR gardens were those which received intermediate treatment.

The VARIETIES of palms were identified by the *fellah* of the garden, by the author's two agricultural assistants, and by the author himself. Very occasionally a rare palm gave rise to discussion, in which case one or two neighbouring garden owners were asked to decide.

By OFFSHOOTS were meant all young palms which were too young to bear fruit. Suckers still on the parent palms were not counted.

All trees of the genus Citrus (*i.e.* Oranges, Limes, etc.) were classed together under the generic name.

Table VIII. Relative Frequency of Palms

Serial Number of Plot	Details of Garden			Number of Date Palms														
	Name of *Maqata*	Name of Owner	Name of Tenant	Number of Female Adult Palms												Number of Male Adult Palms		
				As-hag	Ashgar	Barhi	Braim	Dairi	Digal	Gantar	Halawi	Istaamran	Khadhrawi	Swaidan	Zahidi	Total Female Adults	Unnamed	Total Males
1	ABOO MAGHIRA	ABDUL QADER	YOOSEF IBN MOHAMAD		5						60	75				140		0
2	,, ,,	,, ,,	,, ,, ,,				5	15			15	110	20			165	5	5
3	ABOOL KHASIB	ABDULLA IBN SALIH	NIL	10				5			130	55		5		205		0
4	EUSFAN	SALIH IBN SAIHAB	,,				10			15	80	35				140		0
5	,,	TAHA IBN SHRAIDA	,,					50		15	40	55				160		0
6	,,	,, ,, ,,	,,						5			120				125		0
7	HAMDAN	SAIID HASHIM BEG	,,								205					205		0
8	KOOT ADH DHAHI	ARTIN ISY	?					5	10		25	105	15			160		0
9	,, ,, ,,	,, ,,	?						5			25	155			185		0
10	,, ,, ,,	,, ,,	?								20	25	135			180	5	5
11	,, ,, ,,	,, ,,	?						5		35	115				155	15	15
12	KOOT AL JOOA	YOOSEF STAMBOOLI	MULLA YABER					5	5	5		35	5			55		0
13	SERYJI (FAJAT AL ARAB)	HAJI MAHMOOD AN NAAMA	NIL					35			30	100				165		0
14	,, ,, ,, ,,	,, ,, ,,	,,					5			50	120				175		0
15	,, ,, ,, ,,	,, ,, ,,	,,								110	45				155		0
16	,, ,, ,, ,,	,, ,, ,,	,,					5			135	20				160		0
17	,, ,, ,, ,,	,, ,, ,,	,,					5			115	5				125		0
18	,, ,, ,, ,,	,, ,, ,,	,,					5			20	60	25		10	120		0
19	,,	JASIM IBN HAMADI	,,					15	15		40	50				120		0
20	,, (AL LOOKTA)	ABDUL LATIF	ILIAS AL QAIS								10	15			85	110		0
21	,, ,, ,,	,, ,,	,, ,, ,,			5			20	5	45	35			5	115		0
22	,, ,, ,,	,, ,,	,, ,, ,,					5			100	25			10	140		0
23	,, ,, ,,	,, ,,	,, ,, ,,								110	30				140		0
24	,, ,, ,,	,, ,,	,, ,, ,,				5		1	1	43	43	5		3	101	1	1
TOTAL				10	5	5	20	155	66	41	1418	1303	360	5	113	3501	26	26
Average of the 24 acres				0	0	0	1	6	3	2	59	54	15	0	5	146	1	1

and Fruit Trees in Date Gardens in Area A.

Number of Offshoot Palms										Number of Fruit Trees													Total Palms and Trees	Cultivation	Remarks	Serial Number of Plot
Females							Male	Total Offshoots	Total Palms	Apple	Apricot	Banana	Citrus (all varieties)	Fig	Mulberry	Nectarine	Peach	Plum	Pomegranite	Quince	Vine	Total Trees				
Braim	Dairi	Halawi	Istaamran	Zahidi	Unnamed	Total Female Offshoots																				
		20				20	0	20	160						5					5		10	170	Good	All figures are computed to the number per acre from plots measuring one-fifth acre, except in the case of plot No. 24, which was one acre in area.	1
	5					5	0	5	175				40							5	15	60	235	,,		2
		20				20	0	20	225					5					40			45	270	Fair		3
		15	5			20	0	20	160													0	160	,,		4
		75				75	0	75	235													0	235	Good		5
10		100				110	0	110	235	10	5		5	30		20			10	5		85	320	,,		6
		15				15	0	15	220				55	20	20				5			100	320	,,		7
						0	0	0	160						5							5	165	Bad		8
						0	0	0	185													0	185	,,		9
						0	0	0	185													0	185	,,		10
						0	10	10	180				5	20					10			35	215	,,		11
			20			20	0	20	75						15							15	90	,,		12
						0	0	0	165		10	5			15		5					35	200	Good		13
						0	0	0	175					30	25		15		5		10	85	260	,,		14
					5	5	0	5	160					20	20		10		10			60	220	,,		15
						0	0	0	160						10		20					30	190	,,		16
					20	20	0	20	145	65			10	35	5		5		30		15	165	310	,,		17
5		35	20		10	10	0	10	130	5				5	30						5	45	175	,,		18
				10		60	0	60	180				30					5		5	5	45	225	,,		19
		5	10			10	0	10	120					45							25	70	190	,,		20
				5		15	0	15	130					20		5					30	55	185	,,		21
		10				5	0	5	145				5	85		50			30		50	220	365	,,		22
						10	0	10	150		10			65		40			45		55	215	365	,,		23
		15	2	1		18	0	18	120		5		11	29	15	16			24		17	117	237	,,		24
15	5	310	57	16	35	438	10	448	3975	80	30	5	161	409	165	131	55	5	209	20	227	1497	5472	.. ..		TOTAL
1	0	13	2	1	1	18	0	19	166	3	1	0	7	17	7	5	2	0	9	1	9	62	228	.. ..		Average

Table IX. Relative Frequency of Palms and Fruit Trees in Date Gardens in Area B.

Serial Number of Plot	Details of Garden			Number of Date Palms																			Fruit Trees	Total Palms and Trees	Cultivation	Remarks	Serial Number of Plot
	Name of *Maqata*	Name of Owner	Name of Tenant	Number of Female Adult Palms													Number of Male Adults			Number of Offshoots							
				Bobak	Braim	Chibchab	Dairi	Digal	Gantar	Habsi	Halawi	Istaamran	Khadhrawi	Shookar	Zahidi	Total Female Adults	Gainami	Unnamed	Total Male Adults	Istaamran	Total Offshoots						
25	DORA	SHAIKH SALIH IBN IBRAHIM	TAAB YAQOOB									80	5			85	10		10		0	0	95	Good		25
26	,,	,, ,, ,, ,,	,, ,,				5	5			10	30	20			70	5		5	5 (*a*)	5	0	80	,,	(*a*) It is not certain that these were Istaamran off-shoots. Flooded with sea water each year.	26
27	,,	,, ,, ,, ,,	,, ,,						10			130	15	10		165			0	5	5	0	170	,,		27
28	FAO	THE SHAIKH OF KUWAIT	TAAB SLAISIL									105				105			0		0	0	105	,,		28
29	,,	,, ,, ,, ,,	,, ,,									105				105		15	15		0	0	120	,,		29
30	,,	,, ,, ,, ,,	,, ,,									115				115		20	20		0	0	135	,,	,,	30
31	,,	,, ,, ,, ,,	TAAB HAIDER IBN KALBI		5						5	85				95	15		15		0	0	110	,,	,,	31
32	,,	,, ,, ,, ,,	,, ,, ,, ,,								20	85				105	40		40		0	0	145	,,	,,	32
33	,,	,, ,, ,, ,,	,, ,, ,, ,,								5	105				110			0		0	0	110	,,	,,	33
34	,,	,, ,, ,, ,,	TAAB ABDUR RUDHA			5						110				115			0		0	0	115	,,	,,	34
35	,,	,, ,, ,, ,,	,, ,, ,,	5								80		5		90			0		0	0	90	,,	,,	35
36	,,	,, ,, ,, ,,	,, ,, ,,								15	70			15	100		15	15		0	0	115	,,	,,	36
37	,,	,, ,, ,, ,,	,, ,, ,,			5				5		90	5			105			0		0	0	105	,,	,,	37
TOTAL				5	5	10	5	5	10	5	55	1190	45	15	15	1365	70	50	120	10	10	0	1495	.. .. TOTA			
Average of the 13 Acres				0	0	1	0	0	1	0	4	92	3	1	1	105	5	4	9	1	1	0	115	.. .. Avera			

Table X. Relative Frequency of Palms and Fruit Trees in Date Gardens in Area C.

Serial Number of Plot	Details of Garden			Number of Date Palms																						Number of Fruit Trees		Total Palms and Trees	Cultivation	Remarks	Serial Number of Plot
				Number of Female Adult Palms													Number of Male Adult Palms			Number of Offshoot Palms						Total Palms						
	Name of *Maqata*	Name of Owner	Name of Tenant	Braim	Chibchab	Dairi	Digal	Doowaich	Farsi	Gantar	Halawi	Istaamran	Khadhrawi	Shookar	Zahidi	Total Female Adults	Khiteri	Unnamed	Total Male Adults	Halawi	Istaamran	Khadhrawi	Zahidi	Male	Total Offshoots		Fig	Total Fruit and other Trees				
38	AJARAWIA	SHAIKH SALIH IBN IBRAHIM	SHAMSHOOL IBN OTHMAN	2			1		1		16	2	19		42	83			0				1		1	84		0	84	Good	One acre surveyed	38
39	„ (MUZLAGA)	TAHA IBN MANSOOR	SAIID ABBAS IBN SAIID BAI			6	3			2		57	30	1	1	100	1		1		47	2	1		50	151		0	151	„	„ „ „	39
40	„ (ABED JIDHOOA)	HAJI TAHA	NIL								30				70	100			0						0	100	5	5	105	„		40
41	„ „ „	„ „	„								30	5	25	25	5	90		5	5	5	20				25	120		0	120	„		41
42	„	SHAIKH ABDUL WAHAB	„								40	15	10			65		10	10	5			5	10	20	95		0	95	Bad		42
43	„	„ „ „	„								50	15			10	75			0	5					5	80		0	80	„		43
44	CHABASI	HAJI IGLAIB	„			5						125				130			0		55				55	185		0	185	Good		44
45	„	„ „	„		5	15	5			5	5	85			5	125			0		10				10	135		0	135	„		45
46	„	„ „	„									60	15			75			0		5				5	80		0	80	„		46
47	„	„ „	„	5							35		45			85			0			5			5	90		0	90	„		47
48	„	„ „	„					5			15	45	15		5	85			0						0	85		0	85	„		48
49	JEZIRA	SAIID TALIB BEG	„									30	10			40		5	5						0	45		0	45	Fair		49
50	„	„ „	„				20					30	10			60			0		5				5	65		0	65	„		50
TOTAL				7	5	26	29	5	1	7	221	469	179	26	138	1113	1	20	21	15	142	7	7	10	181	1315	5	5	1320	.. .. TOTAL		
Average of the 13 Acres				1	0	2	2	0	0	1	17	36	14	2	11	86	0	2	2	1	11	1	1	1	14	101	0	0	102	.. .. Average		

Table XI. Relative Frequency of Palm

Serial Number of Plot	Description of Garden			Number of Female Palms											
	Name of *Maqata*	Name of Owner	Name of Tenant	Ashrasi	Awaidi	Barhi	Braim	Daaili	Dairi	Digal	Digal Moosa	Farsi	Gantar	Halawi	Istaamran
51	ABUL KHASIB	HAJI HAMED AMIR	NIL								15			100	45
52	,, ,,	IBRAHIM IBN AL ARAQ	,,			10								150	15
53	,, ,,	SAIID MOHD. IBN SAIID ABOORKAT	,,						10				15	180	5
54	EUSFAN	TAHA IBN SHRAIDI	,,							5				70	40
55	,,	,, ,, ,,	,, (Same Garden)						5	5			10	80	50
56	FAIYA	ABDULLA IBN MULLA ISA	,,						15	20		5	5	70	50
57	,,	,, ,, ,, ,,	,, (Same Garden)	5										75	70
58	HAMDAN	SAIID ISA IBN SAIID MOHAMAD	,,				25		5	5				40	55
59	,,	MUKHTAR HAJI YAQOOB	,,		5				15					15	100
60	,,	BERIAS IBN MADHI	,,				10		10	5				85	30
61	,,	,, ,, ,,	,, (Same Garden)				20		5					15	125
62	,,	,, ,, ,,	,, (Same Garden)						10					30	95
63	,, (EL MAARIF)	*WAQAF*	TAAB MOHAMAD IBN KHAN ALI				10	5	5					95	50
64	,,	,,	,, EN NAIAMA				20		10				5	150	10
65	,,	,,	,, ABDULLA IBN ZYER MEHSIN						10					5	50
66	,, (HAMAIZA)	MOHAMAD IBN HAJI YASIN	NIL						40	5			5	15	130
67	,, ,,	,, ,, ,, ,,	,, (Same Garden)				5		5	15			30	25	145
68	KOOT ATH THWAINI	*WAQAF*	TAAB JASIM IBN NABIT				5		5	5				15	10
69	MAHAIJERAN (AL ODA)	?	IBRAHIM IBN MAHAIWIL						5	5			5		150
70	,, ,, ,,	?	,, ,, ,, (Same Garden)				5							25	135
71	,, (BAB AL IYAS)	YASIN AL AMIR	TAAB MASHARI IBN GHANIM				5		25	15				45	15
72	,, (AL HORA)	AHMED AR RASHID	NIL										5		65
73	,, ,, ,,	,, ,, ,,	,, (Same Garden)				5		10	5			5		75
TOTAL				5	5	10	110	5	190	90	15	5	85	1285	1515
Average of the 23 Acres..				0	0	0	5	0	8	4	1	0	4	56	66

s and Fruit Trees in Date Gardens in Area D.

Number of Date Palms															Number of Fruit Trees												Total Palms and Trees	Cultivation	Remarks	Serial Number of Plot
				Number of Male Palms			Number of Offshoot Palms																							
Khadhrawi	Maktoom	Zahidi	Total Females	Khirki	Unnamed	Total Males	Braim	Gantar	Halawi	Istaamran	Khadhrawi	Zahidi	Male	Total Offshoots	Total Palms	Apple	Apricot	Citrus	Fig	Mulberry	Nectarine	Plum	Pomegranate	Quince	Vine	Total Trees				
5			165			0	5		20					25	190				40	20					10	70	260	Fair		51
5			180		5	5			5					5	190				35	15			30			80	270	,,		52
			210			0			10					10	220			25	5	20						50	270	Good		53
5			120			0	5	5	40					50	170	15		50	20		55		20	55	5	220	390	,,		54
			150	10		10	5		25					30	190			45	25		30		25	45	25	195	385	,,		55
			165			0			50					50	215		20	25	35		5		30	5	20	140	355	,,		56
		5	155			0			5	5		10		20	175			80		5	10					95	270	,,		57
			130	10		10			30					30	170			30	5				40	15	10	100	270	Bad		58
			135	5		5								0	140				50				70	5		125	265	Fair		59
5			145			0			20					20	165				5				35			40	205	Poor		60
			165			0			20					20	185			25		10			15			50	235	,,		61
			135			0			30					30	165			5	10	10			5			30	195	,,		62
			165		5	5			10					10	180				30				50		15	95	275	Bad		63
			195			0			60					60	255			65	60	25		5	15	15	15	200	455	,,		64
			65			0				10				10	75											0	75	Bad		65
			195			0				20				20	215											0	215	,,		66
5			230			0								0	230											0	230	,,		67
95	10		145	15		15					10			10	170											0	170	Poor		68
			165			0			20					20	185											0	185	Bad		69
5			170		5	5			5					5	180											0	180	,,		70
15			120			0			5				5	10	130								40	100	10	150	280	Good		71
15			85			0			20					20	105											0	105	Poor		72
30			130		5	5			10					10	145								10			10	155	,,		73
185	10	5	3520	40	20	60	15	5	385	35	10	10	5	465	4045	15	20	350	320	105	100	5	385	240	110	1650	5695	..	..	..	TOTAL
8	0	0	153	2	1	3	1	0	17	2	0	0	0	20	176	1	1	15	14	5	4	0	17	10	5	72	248	..	..	..	Average

Table XII. Relative Frequency of Palms and Fruit Trees in Date Gardens in Area E.

Serial Number of Plot	Description of Garden			Number of Date Palms																												Number of Fruit Trees							Total Palms and Trees	Cultivation	Remarks	Serial Number of Plot
				Number of Female Palms																	Number of Male Palms			Number of Offshoot Palms								Total Palms										
	Name of *Maqaia*	Name of Owner	Name of Tenant	Asabiat al Aroos	Ashgar	Braim	Dairi	Digal	Digal Moosa	Gantar	Hadal	Halawi	Hamrawi	Istaamran	Khadhrawi	Khasab	Shirani	Shookar	Total Females	Khiiki	Unnamed	Total Males	Braim	Dairi	Halawi	Istaamran	Khadhrawi	Zahidi	Male	Total Offshoots		Apricot	Mulberry	Pomegranate	Vine	Willow	*Ziziphus Spina-Christi*	Total Trees				
74	AJARAWIA	HAROON YAMIN	HASHIM IBN INYIM				15			5				65	15				100			0				15				15	115			10				10	125	Fair		74
75	,,	,, (Same garden)	,, ,, ,,			5	10	5						60	25				105			0				30				30	135			20				20	155	,,		75
76	,,	,, ,, ,,	,, ,, ,,				25	5						35	30				95			0				25				25	120			25				25	145	,,		76
77	DAAIJI	*SANIA*	TAAB SAIID QASIM			3	7	1		1				26	2			1	41		2	2		1	1	14	1		1	18	61		3	1				4	65	Good	$1\frac{3}{4}$ Acres Surveyed	77
78	,,	,, (Same Garden)	,, ,, ,,			1	2			2				34	3				42		1	1			5	12	1			18	61	1					2	3	64	,,	$2\frac{1}{2}$,, ,,	78
79	,,	,, ,, ,,	,, ,, ,,		1			2		7		1	1	42	2				56			0		3	1	13	2			19	75		1	4	1		2	8	83	,,	$1\frac{1}{8}$,, ,,	79
80	,,	,, ,, ,,	,, ,, ,,		2	2	3	2	1	2		6		58	4	2	1		83		4	4		1	2	14	1		1	19	106		9					9	115	,,	$1\frac{1}{4}$,, ,,	80
81	,,	,, ,, ,,	,, ,, ,,		2	2	2	8		10				40	7				71			0	2		5	2	10	10		29	100		7				2	9	109	,,	$\frac{3}{4}$,, ,,	81
82	JEZIRA	SAIID ABD AL QADER	SAIID IBN ZYER	5			5							25					35	5		5								0	40							0	40	,,		82
83	,, (Same Garden)	,, ,, ,, ,,	,, ,, ,,								5			30	10			5	50	5		5		5						5	60							0	60	,,		83
84	,, ,, ,,	,, ,, ,, ,,	,, ,, ,,								5			40	10				55			0								0	55					15		15	70	,,		84
TOTAL				5	5	13	69	23	1	27	10	7	1	455	108	2	1	6	733	10	7	17	2	10	14	125	15	10	2	178	928	1	20	60	1	15	6	103	1031	.. .. TOTAL		
Average of the 11 Acres				0	0	1	6	2	0	2	1	1	0	41	10	0	0	1	67	1	1	2	0	1	1	11	1	1	0	16	84	0	2	5	0	1	1	9	94	.. .. Average		

Table XIII. General Statement Showing Average Relative Frequency of Different Varieties of Date Palms in Shat Al 'Arab Date Gardens.

Area	Actual Totals and Averages	Number of Palms — Number of Female Palms																													Number of Male Palms				Number of Offshoot Palms											Area
		Asabiat al Aroos	As-hag	Ashgar	Ashrasi	Awaidi	Barhi	Bobak	Braim	Chibchab	Daaili	Dairi	Digal	Digal Moosa	Doowaich	Farsi	Gantar	Habsi	Hadal	Halawi	Hamrawi	Istaamran	Khadhrawi	Khasab	Maktoom	Shirani	Shookar	Swaidan	Zahidi	Total Females	Gainami	Khirki	Unnamed	Total Males	Braim	Dairi	Gantar	Halawi	Istaamran	Khadhrawi	Zahidi	Male	Unnamed	Total Offshoots	Total Palms	
A	A.T.		10	5			5		20			155	66				41			1418		1303	360					5	113	3501			26	26	15	5		310	57		16	10	35	448	3975	A
	Av.								1			6	3				2			59		54	15						5	146			1	1	1			13	2		1		1	19	166	
B	A.T.							5	5	10		5	5				10	5		55		1190	45				15		15	1365	70		50	120					10					10	1495	B
	Av.									1							1			4		92	3				1		1	105	5		4	9					1					1	115	
C	A.T.								7	5		26	29		5	1	7			221		469	179				26		138	1113		1	20	21				15	142	7	7	10		181	1315	C
	Av.								1			2	2				1			17		36	14				2		11	86			2	2				1	11	1	1	1		14	101	
D	A.T.				5	5	10		110		5	190	90	15		5	85			1285		1515	185		10				5	3520		40	20	60	15		5	385	35	10	10	5		465	4045	D
	Av.								5			8	4	1			4			56		66	8							153		2	1	3	1			17	2					20	176	
E	A.T.	5		5					13			69	23	1			27		10	7	1	455	108	2		1	6			733		10	7	17	2	10		14	125	15	10	2		178	928	E
	Av.								1			6	2				2		1	1		41	10				1			67		1	1	2		1		1	11	1	1			16	84	
Actual Totals		5	10	10	5	5	15	5	155	15	5	445	213	16	5	6	170	5	10	2986	1	4932	877	2	10	1	47	5	271	10232	70	51	123	244	32	15	5	724	369	32	43	27	35	1282	11758	Actual Totals
Average throughout the *Sanjak* according to the 84 Plots Surveyed		—	—	—	—	—	—	—	2	—	—	5	3	—	—	—	2	—	—	36	—	59	10	—	—	—	1	—	3	122	1	1	1	3	—	—	—	9	4	—	1	—	—	15	140	Average

Note.—In the second column, "A.T." stands for the "Actual Totals in all the surveyed plots (reduced to acres) of the particular area," and "Av." stands for "Average number per acre."

Table XIV.

General Statement showing Average Relative Frequency of Palms and Fruit Trees in Shat Al 'Arab Date Gardens

Area		Number of Fruit Trees														Total Palms (From last column of table XIII.)	Total Palms and Fruit Trees	Remarks
		Apple	Apricot	Banana	Citrus	Fig	Mulberry	Nectarine	Peach	Plum	Pomegranate	Quince	Vine	Willow	*Ziziphus Spina-Christi*	Total Fruit Trees			
A	Actual	80	30	5	161	409	165	131	55	5	209	20	227	—	—	1,497	3,975	5,472	All figures in the "Actual" columns are computed to the nearest whole number per acre from plots measuring in most cases one-fifth of an acre. The few willow trees found have been classed with the Fruit Trees.
	Average	3	1	—	7	17	7	5	2	—	9	1	9	—	—	62	166	228	
B	Actual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	1,495	1,495	
	Average	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	115	115	
C	Actual	—	—	—	—	5	—	—	—	—	—	—	—	—	—	5	1,315	1,320	
	Average	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	101	102	
D	Actual	15	20	—	350	320	105	100	—	5	385	240	110	—	—	1,650	4,045	5,695	
	Average	1	1	—	15	14	5	4	—	0	17	10	5	—	—	72	176	248	
E	Actual	—	1	—	—	—	20	—	—	—	60	—	1	15	6	103	928	1,031	
	Average	—	—	—	—	—	2	—	—	—	5	—	—	1	1	9	84	94	
TOTAL	Actual	95	51	5	511	734	290	231	55	10	654	260	338	15	6	3,255	11,758	15,013	
	Average	1	1	—	6	9	3	3	1	—	8	3	4	—	—	39	140	179	

FACTS APPARENT FROM TABLES VIII. TO XIV.

The following main facts of interest may be deduced from the Tables VIII. to XIV. :—

(1) Palms are most dense in Area D, where the average number is 176 per acre, and least dense in Area E, where the average is 84 per acre. The relative frequencies are illustrated in Sketch Map III.

(2) Throughout the Shat Al 'Arab date zone the average frequency of palms and fruit trees per acre appears to be as follows :—

Total Palms and Trees, 179.

Total Palms, 140.

Total Female Palms, 122 :—

ISTAAMRAN ..	59
HALAWI ..	36
KHADHRAWI .	10
DAIRI ..	5
ZAHIDI ..	3
DIGAL ..	3
GANTAR ..	2
BRAIM ..	2
SHOORAR ..	1
Others ..	1

Total Male Palms, 3 :—

GAINAMI ..	1
KHIKRI ..	1
Others ..	1

Total Offshoot Palms, 15 :—

HALAWI ..	9
ISTAAMRAN ..	4
ZAHIDI ..	1
Others ..	1

Total Fruit Trees, 39 :—

FIG	9
POMEGRANATE	8
CITRUS ..	6
VINE ..	4
MULBERRY ..	3
QUINCE ..	3
NECTARINE ..	3
APPLE ..	1
PEACH ..	1
APRICOT ..	1

The distribution of date palms and fruit trees is in the proportion 78 : 22. This is illustrated by Diagram II.

The percentage frequency of all varieties of date palms of all kinds (*i.e.* adult male and female and offshoot) is therefore as follows :—

ISTAAMRAN	45 %
HALAWI	32 %
KHADHRAWI	8 %
DAIRI	4 %
ZAHIDI	3 %
All others	8 %

This is illustrated by Diagram III.

(3) In areas A and D the commonest kind of palm is the HALAWI, but in the remaining areas the most common kind of palm is the ISTAAMRAN.

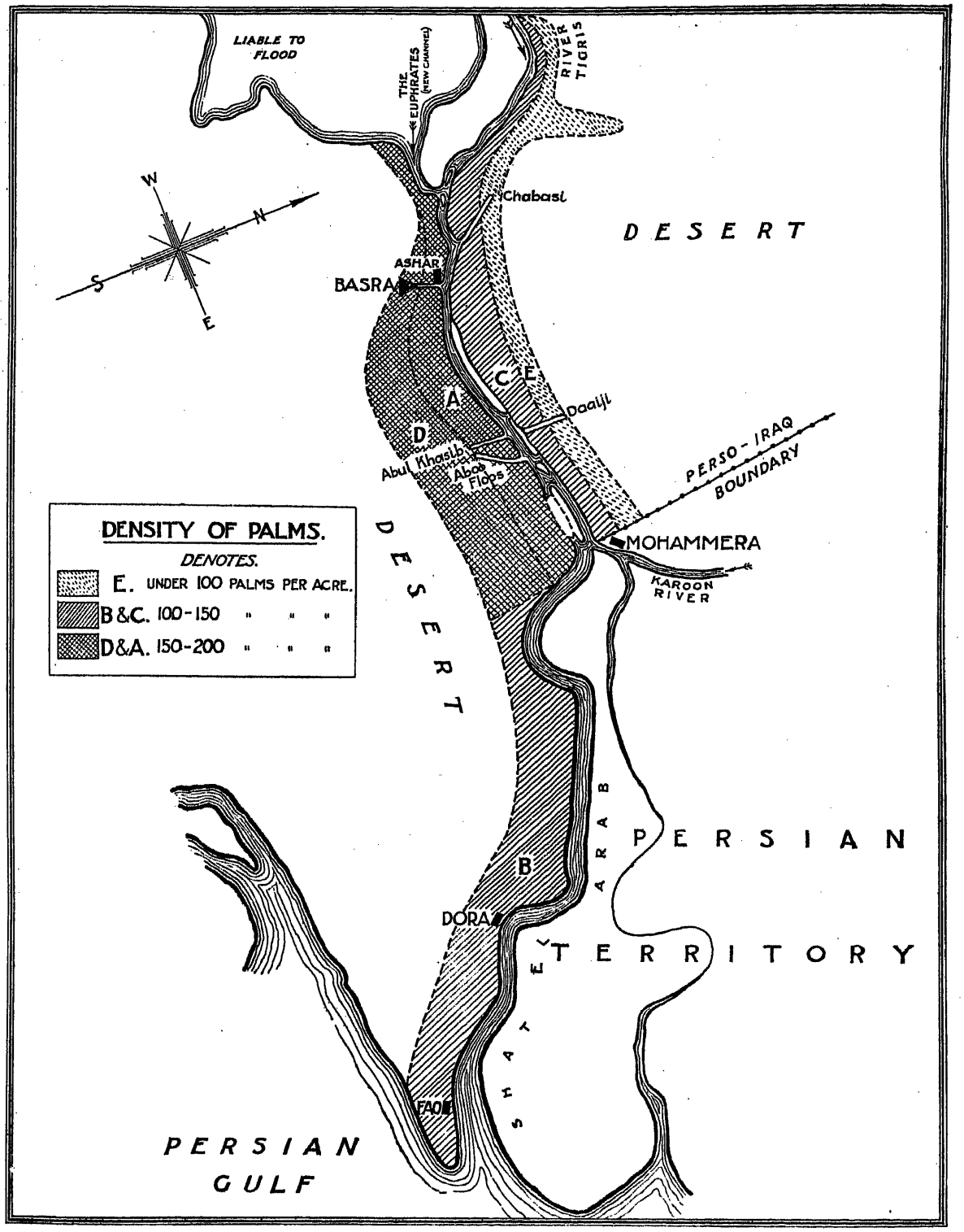
(4) Male palms are most common at Fao. It is from this region that much pollen is exported to places where land is so valuable that it is all taken up with female palms, *e.g.* Abool Khasib. By far the commonest female palm at Fao is the ISTAAMRAN. The probable explanation of this is that this variety is relatively resistant to the effects of saline water. The flavour of this date normally is slightly salt, but at Fao it is still more so.

(5) The choicest dates are the scarcest, although KHADHRAWI, HALAWI, and DAIRI are good dessert dates. ZAHIDI is perhaps the least choice date and ISTAAMRAN next.

(6) Fruit trees are of greatest frequency in Areas D and A, where the average numbers per acre are 72 and 62 respectively, while Areas B and C are almost bare of fruit trees, and in Area E there are but very few more.

(7) The most closely planted plot that was surveyed was at Hamdan, where the date palms and fruit trees averaged 456 per acre. This number included 150 adult HALAWI palms and sixty-five CITRUS trees. The plot which contained the greatest number of adult female palms was also at Hamdan. Here the palms were present at the rate of 230 per acre. This figure included 145 ISTAAMRAN to the acre.

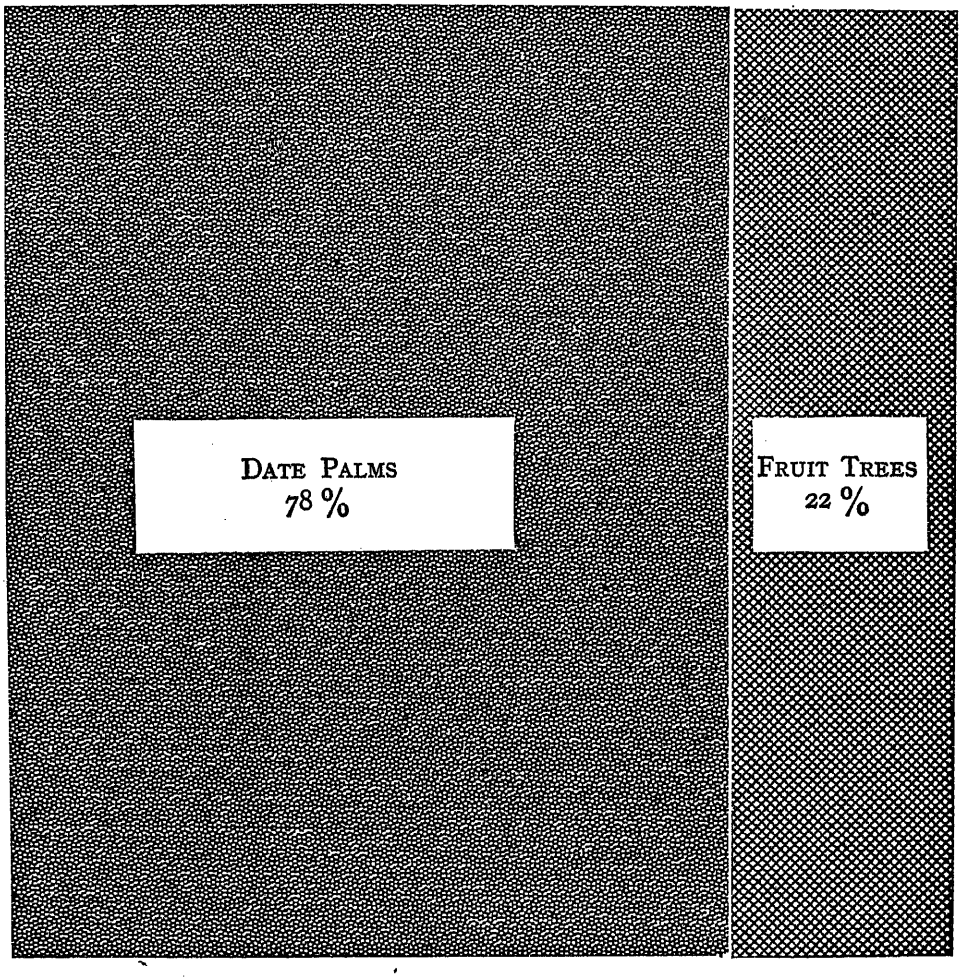
SKETCH MAP III. SHOWING DENSITY OF DATE PALMS.



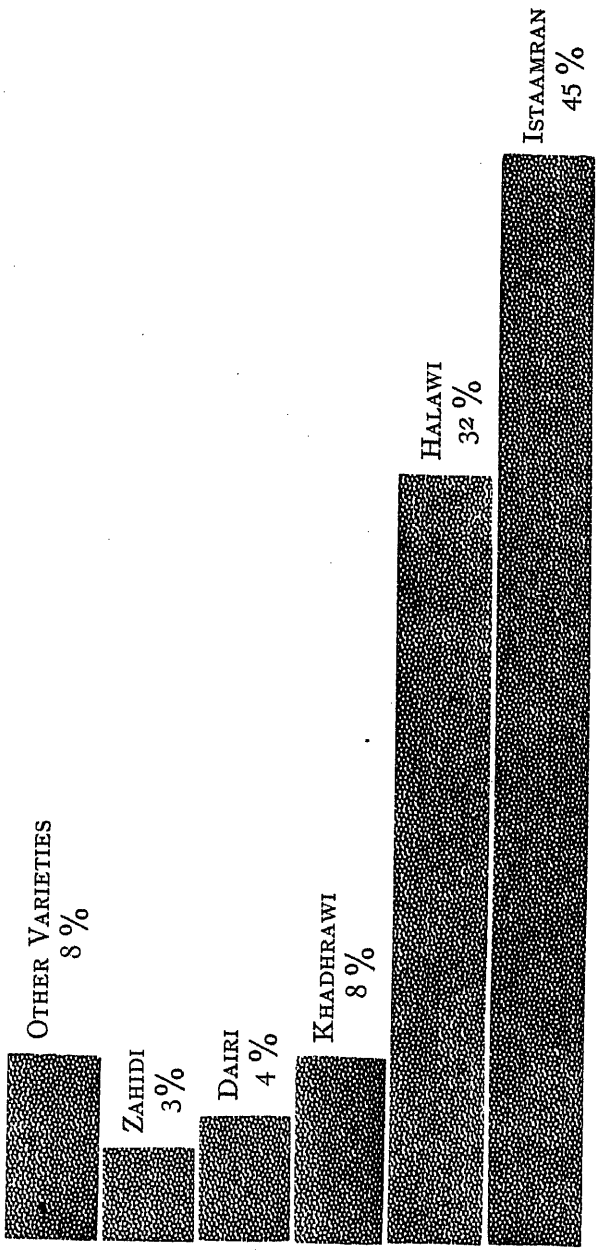
(*Not to scale.* The depth of the Palm Belt is exaggerated).

DIAGRAM II.

RELATIVE FREQUENCY OF DATE PALMS AND FRUIT TREES IN SHAT AL 'ARAB DATE GARDENS.



PERCENTAGE FREQUENCY OF ALL VARIETIES OF SHAT AL 'ARAB DATE PALMS



YIELD PER ACRE OF DATES IN SHAT AL 'ARAB DATE GARDENS.

The average yield of *tamar* dates in pounds per acre of Shat Al 'Arab date gardens now can be estimated from the two foregoing sets of data by multiplying the yield in pounds per acre of each variety by the average number of palms of that variety per acre and adding the results obtained. This final figure is 4,920 lb.

Although this average figure for the whole Shat Al 'Arab date lands is probably fairly correct, yet it is not possible to place the same reliance on the figures for the average yields of dates per acre in each of the five areas, because, although the frequencies of the palms have been determined for each area, yet the yields of all varieties have been determined not separately in each area, but for the Shat Al 'Arab as a whole. It is probable, however, that the frequencies of distribution vary in the different areas to a greater extent than do the yields. It is understood, therefore, that the results shown in Table XV. must be accepted with reserve. The results of this table are given in Diagram IV.

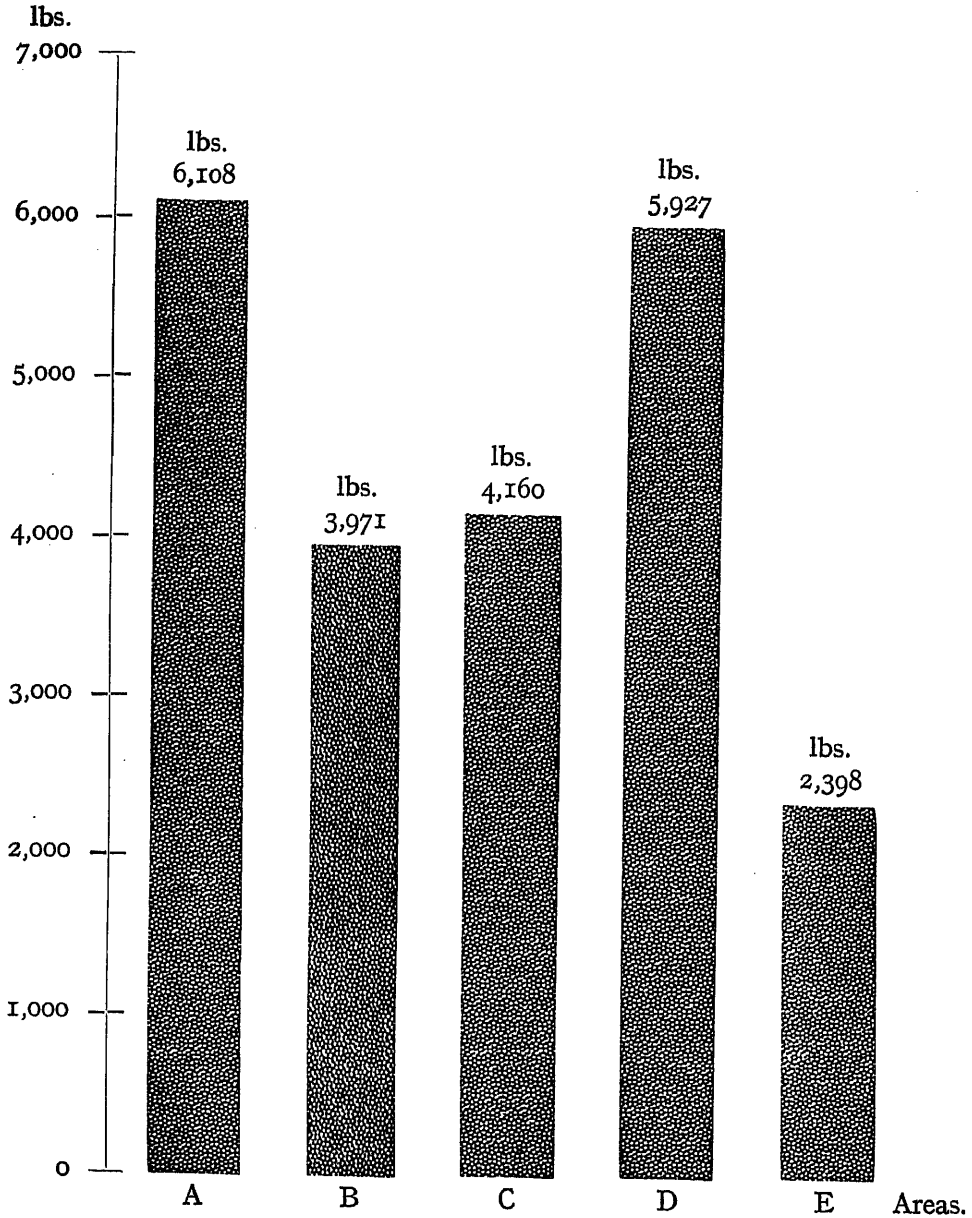
TABLE XV.

AVERAGE YIELD IN LBS. PER ACRE OF ALL *TAMAR* DATES IN EACH OF THE AREAS A, B, C, D & E.

Area	Variety of Date.												Average Yield of Dates in lbs. per acre.
	ISTAAMRAN		HALAWI		KHADHRAWI		DAIRI		ZAHIDI		Other Females.		
	No. of adult Plms. per Acre	Av. Yld. Dts. per Plm.	No. of adult Plms. per Acre	Av. Yld. Dts. per Plm.	No. of adult Plms. per Acre	Av. Yld. Dts. per Plm.	No. of adult Plms. per Acre	Av. Yld. Dts. per Plm.	No. of adult Plms. per Acre	Av. Yld. Dts. per Plm.	No. of adult Plms. per Acre	Av. Yld. Dts. per Plm.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	54	37	59	44	15	30	7	32	5	126	6	35	6,108
B	92	37	4	44	3	30	0	32	1	126	5	35	3,971
C	36	37	17	44	14	30	2	32	11	126	6	35	4,160
D	66	37	56	44	8	30	8	32	0	126	15	35	5,927
E	41	37	1	44	11	30	6	32	0	126	9	35	2,398
Av. whole *Sanjak*	59	37	36	44	10	30	5	32	3	126	9	35	4,920

DIAGRAM IV.

SHOWING AVERAGE YIELD IN LBS. PER ACRE OF ALL *TAMAR* DATES IN EACH OF THE AREAS A, B, C, D, & E.



CONCLUSION

The average yield of *tamar* dates per acre in the Shat Al 'Arab date lands in the year 1919 appears to have been 4,920 lb., made up as follows :—

ISTAAMRAN	2,183	lbs.
HALAWI	1,584	,,
KHADHRAWI	300	,,
DAIRI	160	,,
ZAHIDI	378	,,
Others	315	,,
Total	4,920	,,

The prices of dates fluctuates rapidly and between wide limits, so that it is not easy to state with any exactness what is the average price. For further details on this point reference may be made to Part I. of this note. A very rough approximation to the prices paid to garden-owners during the last two years would be somewhat as follows :—

ISTAAMRAN, DAIRI, Others	Rs. 300/-	a	*Kara*	of 6,048 lbs.
HALAWI, KHADHRAWI	Rs. 400/-	,,	,,	,,
ZAHIDI	Rs. 250/-	,,	,,	,,

Taking these figures as a basis, the gross value of *tamar* dates per acre of Shat Al 'Arab date lands would seem to lie somewhere about 272 Rs. Many conversations with garden owners tend to confirm this figure. The value per acre over the whole district of the *khalal* and *ratab* dates sold might be estimated roughly at 20 Rs.

No attempt was made during the inquiry to ascertain the value of the fruit other than dates produced in this region. Its value per acre in Areas A and D (*vide* Table XIV.) must be considerable : elsewhere it is negligible.

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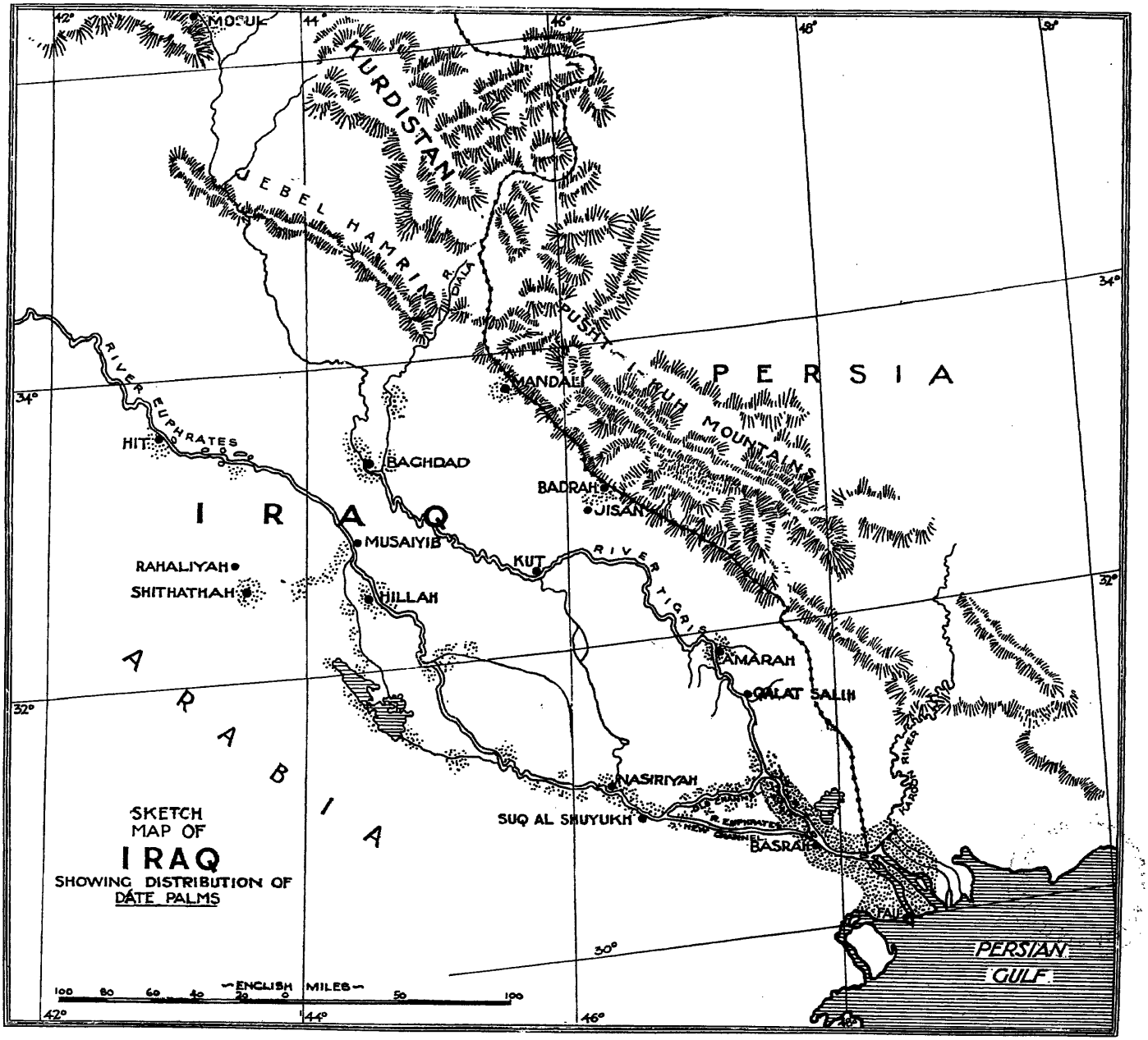
MOSUL
KURDISTAN
JEBEL HAMRIN
R. DIALA
PUSHT-I-KUH MOUNTAINS
PERSIA
MANDALI
RIVER EUPHRATES
HIT
BAGHDAD
BADRAH
JISAN
I R A Q
MUSAIYIB
KUT
RIVER TIGRIS
RAHALIYAH
SHITHATHAH
HILLAH
AMARAH
QALAT SALIH
A R A B I A
NASIRIYAH
SUQ AL SHUYUKH
BASRAH
FAU
PERSIAN GULF
SKETCH MAP OF
IRAQ
SHOWING DISTRIBUTION OF DATE PALMS
ENGLISH MILES
100 80 60 40 20 0 50 100
42°
44°
46°
48°
50°
32°
34°

AGRICULTURAL DIRECTORATE, MINISTRY OF INTERIOR, 'IRAQ (Mesopotamia) Memoir III.

Dates & Date Cultivation of the 'Iraq

BY

V. H. W. DOWSON, B.A. (DIP. AGRIC., CANTAB.)

Agricultural Directorate of 'Iraq

PART III.

The Varieties of Date Palms of the Shatt Al 'Arab

PRINTED AND PUBLISHED FOR
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1923

FOREWORD

THE primary object in writing this memoir was that of providing the Revenue Department of the 'Iraq with data collected during an investigation into the yield of date palms in Shatt Al 'Arab date gardens during 1919. It was realised, however, that as date palms are not all of one variety, and as their yields differ in quantity and value, notes on the different varieties to be found would be of use to revenue officials; and consequently, to the already published notes on cultivation and yield there have been added the following brief descriptions of the chief date varieties of the Basrah district.

The delay in publication has been due to the urgency of other work, which has left free only recreation time for the preparation of the manuscript for the press. Its preparation, indeed, has been more of a recreation than a labour, because the date palm is so interwoven into the history, literature, and the life of the Arab race that its student lives in an Arab atmosphere; and this, for one who regards this people with sentiments of affection and esteem, has not failed to prove recreative.

V. H. W. DOWSON.

TRINITY HALL, CAMBRIDGE,
December, 1921.

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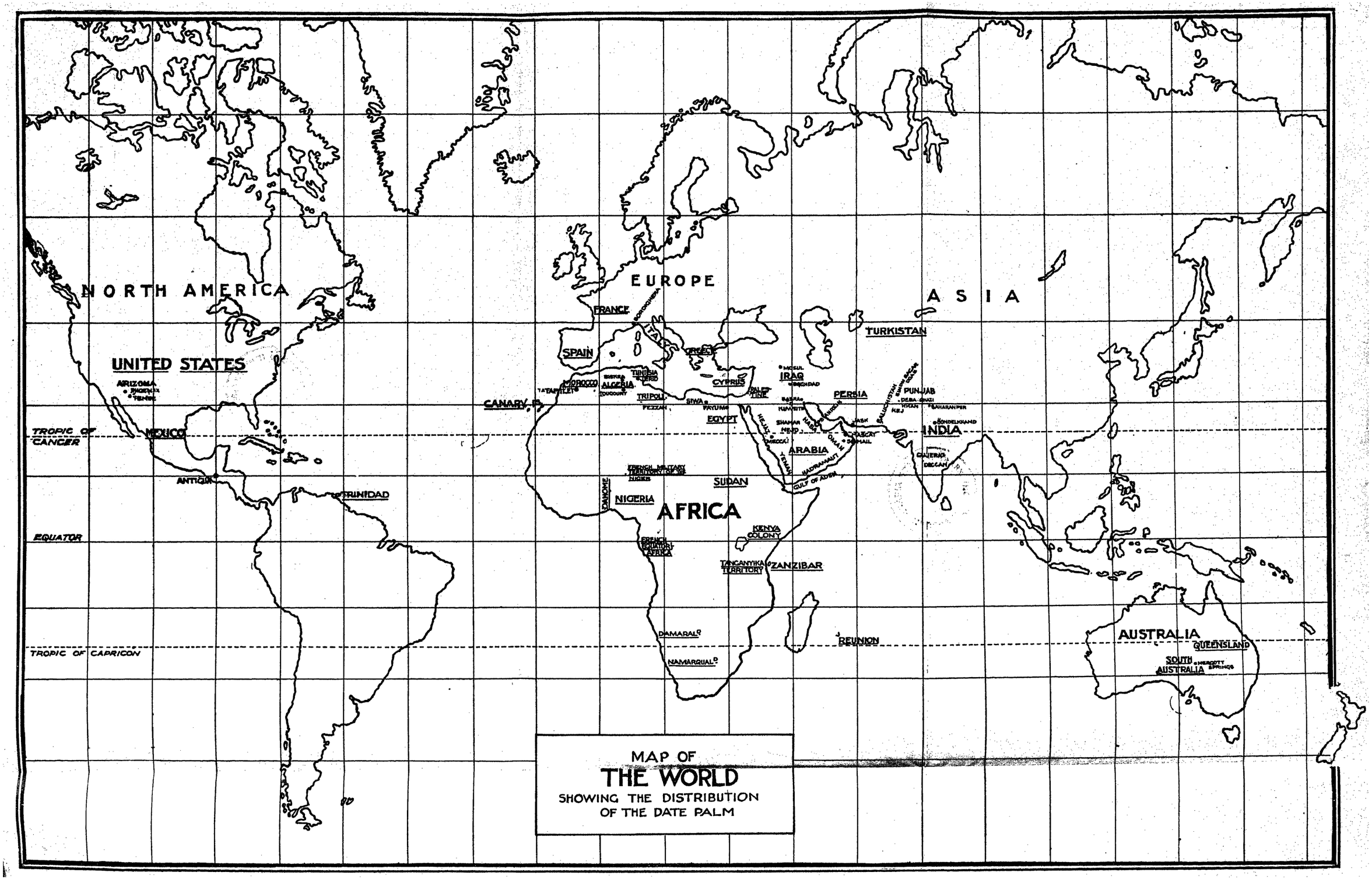

MAP OF

THE WORLD

SHOWING THE DISTRIBUTION OF THE DATE PALM

THE DISTRIBUTION OF DATE PALMS

The date palm has been known to fruit in all the continents with the exception of South America. In EUROPE, it has fruited in SPAIN (Rozmital, *Swingle), BALEARIC ISLANDS (Cambessedes), FRANCE (Dic. des Sc. Nat., Vol. XII., Haldane, Graebner), ITALY (Brandis, Haldane, Link), and GREECE (Link). In NORTH AFRICA, the date palm is reported as fruiting in the CANARY ISLANDS (Webb and Bertholot), in MOROCCO (Rohlfs, En. Brit., Gatin, Popenoe), in ALGERIA (Shaw, Barth, Cosson, Jus, Rolland, Marcassin, Rose, Swingle, Sommerville, Kearney, Charlet, Arnaud, Watt, Gatin, Popenoe), in TUNISIA (Shaw, Yeats, Trop. Ag. 1889, Clam, Espinasse-Langeac, Fresnel, Swingle, Masselot, Kearney, Jeangérard, En. Brit., Gatin, Popenoe), in TRIPOLI (Denham and Clapperton, Barth, Vogel, Rohlfs, Richardson, En. Brit., Forbes, R.), in the FRENCH MILITARY TERRITORY OF THE NIGER (Barth), in DAHOME (Barth), in FRENCH EQUATORIAL AFRICA (Barth), in NIGERIA (Barth), in EGYPT (Herodotus, Burton, Delchevalerie, Moldenke, Edwards, Ziemssen, Klunzinger, Swingle, Bonaparte, Kearney, Beadnel, Bois, En. Brit., Paoletti, Popenoe, Eisen, Willcocks, Mason, Brown, Gough), in ZANZIBAR (McClellan), in TANGANYIKA TERRITORY (Bul. Imp. Inst.), in DAMARALAND and NAMAQUALAND (Ag. Jnl. Cape of Good Hope). In ASIA, date palms bear fruit in CYPRUS (Bevan), in PALESTINE (Mishnah, the Bible, Shaw, Raguse, Blondel, Haldane, Aaronsohn), in TURKISTAN (Brandis), in ARABIA (*Hejaz*—Bartema, Burckhardt, Burton, Al Madani, Doughty, En. Brit.; *Yeman*—Engler and Prantl; *Hadramaut*—Dowson; *Nejd*—Palgrave; *Oman*—Swingle, Fairchild, Popenoe; *Hasa*—Palgrave, Cuinet, Fairchild, Popenoe), in the PERSIAN GULF (*'Iraq*—Herodotus, Benjamin of Tudela, Niebuhr, Buckingham, Colvill, Fogg, Blunt, Forbes, L. A., Zwemer, Fairchild, Kemball, Marie, Popenoe, Foaden, Buxton, Dowson, Graham, Thomas; *Persia*—Bunge, Fischer, Sykes, Fairchild; *Baluchistan*—Fischer, Fairchild), and in INDIA (Brandis, Bonavia, Watt, Dey, Stocks, Gamble, Lehmann, Sly, Shubrick, Milne, Mackenna).

The date palm has been introduced into AUSTRALIA, and is reported as yielding edible fruit in QUEENSLAND (Queensland Ag. Jnl.) and in SOUTH AUSTRALIA (An. Rpt. State Forest Admn.). Considerable success appears to have attended the introduction of the date palm into the hotter and drier parts of AMERICA. For details of the crop in the UNITED STATES see Cockerell, Shinn, Washburn, Stone and Smith, Craw, Toumey, McClatchie, Forbes, R. H., Swingle, Budd and Hansen, Pieters, Vinson, Prestibytik, Coit, Freeman, Peterson, Blair, Popenoe, and Drummond. In MEXICO also palms fruit regularly (Swingle), and in the WEST INDIES inferior fruit is produced (*Antigua*—Sands; *Trinidad*—Hart).

* Names of authorities are arranged in chronological order.

DATE VARIETIES AND THEIR CLASSIFICATION

English people are familiar with the fact that apples are of many different varieties, but they are apt to regard dates as all of one kind. However, as there exists a great difference between the crab apple and the Blenheim, and again between the Blenheim and the Cox's Orange Pippin, so also there exists a great difference between the chance seedling date and the DEGLET NUR, for example, and again between the DEGLET NUR and the IBRAHIMI. In the following pages will be found mentioned the names of three hundred and eighty different varieties of date palms. Some of the subject references have not been attainable, but it is probably correct to say that up to the present not more than about four hundred different varieties of dates have been described, and the number of palms described is much less than this.

Most observers have been at more pains to record the characteristics of dates than of date palms. This is to be expected, because varietal differences are more easily noticeable in the former than in the latter, and fruit characters are less susceptible of individual variation than the vegetative. Commercially, Europeans frequently find it useful to be able to distinguish varieties of the marketable commodity,-dates, but of little value to know apart the palms which bear them. To distinguish between varieties of palms is a difficult matter, though those who live to tend them are often marvellously proficient. Many times, returning home after sunset along the shore of the Shatt Al 'Arab, the author has wondered at the acuteness of perception of his Arab companions, who could tell the variety of nearly every palm merely by its black silhouette against the indigo sky. When questioned as to what points of distinction they noticed, they would be unable to reply satisfactorily; they *felt* the palm was, it might be, ISTA'AMRAN, but found it difficult to describe the many small characters which separated it from all others. Similarly in England, many successful farmers will name readily the variety of wheat growing in a field, but will not find it possible to explain *why* they recognise it.

Mr. Mason (*Bulletin* No. 223, U.S.A. Dept. of Agric., 1915) has spent much time in making measurements of various structures of the date palm in order to devise a system of classification of date palms. For example, he has measured to a ten-thousandth of an inch the thickness of the pinnæ of some varieties, and has also measured the angles of divergence of the pinnæ from the axis of the leaf and from the plane of the axis, as well as the lengths

of leaves, pinnæ, and other structures. It is the opinion of many botanists, however, that such exact data do not provide satisfactory means of distinguishing between varieties of plants, owing to individual fluctuations being often greater than varietal differences. The proportions of one series of measurements have been found to be of more use; but, it would seem that up to the present time there is no method devised better than eye judgment in varietal classification of date palms. Consequently, in the following descriptions of the dates and date palms of the Shatt Al 'Arab actual measurements have been given in only a few instances, and an attempt has been made to describe varieties by noting into which of three classes falls each of their more prominent characters. The three classes serve to indicate (1) an excess, (2) an intermediate amount, and (3) a deficiency of the character in question. Thus, for example, a frond might be described as "long," "medium," or "short"; or spines as "many," "medium," or "few."

In view of the extended habitat of the date palm, a large number of different varieties is to be expected, but nothing appears to be known about their origin. There is a tradition in Basra that there was originally only one female variety, ZAHIDI, and one male variety, KHIKRI, and from these all others developed, presumably as seminal sports. There appears nothing to support this view beyond the fact that of all 'Iraqi varieties, the ZAHIDI and the KHIKRI are the most widely distributed, and the fact that they are both inferior varieties. One may see, however, the process of formation of new varieties still operating. Given a few female and a few male varieties, the possible combinations are very many. If chance seedlings are allowed to grow, and if their dates be of good quality, their offshoots are planted out, and the type is preserved. The ordinary name in the 'Iraq for a seedling is DIGLA (in Mascat it is QASH, in Egypt, BALADI). A DIGLA which is considered worthy of propagation needs a name to distinguish it from its fellows, and frequently the name of its first owner becomes added. Thus, for example, there are now recognised as definite varieties DIGAL 'ABAS, DIGAL 'ABD AL A'LI, and DIGAL MUSA. In time, as the numbers increase, the prefix DIGAL tends to be omitted. Old-fashioned people still talk of DIGAL 'ASABIAT AL 'ARUS; but this is too long a name for the present generation, which consequently omits the DIGAL. An old garden owner assured the author that, in his childhood, the HALAWI (to which variety now belongs one palm in three on the Shatt Al 'Arab) was an uncommon variety, which had originated some time previously as a chance seedling. Appreciation of its value led to its rapid multiplication.

Before considering in some detail the varieties of date palms of the Shatt Al 'Arab, it may be useful to indicate what varieties have been described already from other parts of the world.

THE VARIETIES OF DATE PALMS OF THE WORLD

Since the days of the classic Arab authors who have from time to time described date varieties which they came across or heard about, but few accounts were published until towards the end of last century, when French colonists in North Africa and Americans in the south-western States began to realise the profitable nature of date cultivation, and to engage in it themselves. Thus, within the last half century, a considerable number of varieties of palms from the more accessible parts of Algeria and Tunisia were described; and the United States Department of Agriculture has sent botanical explorers to those places, and to Egypt, the Sudan, and the Persian Gulf to obtain offshoots for introduction into America. As a result, there is now available some information concerning the varieties of date palms growing in the following places:—

Morocco	Algeria	Tunisia	Tripoli	Egypt
The Sudan	Cyprus	Hejaz	Hadramaut	Oman
Hasa	'Iraq	Persia	Baluchistan	

With regard to the varieties of date palms to be found fruiting in Europe, Tropical and South Africa, Palestine, Turkistan, and the West Indies, nothing seems to have been published.

MOROCCO

Rohlfs, who journeyed through Morocco in 1864, mentioned that the best dates in this part of northern Africa are those of Tafilet, and of these the most esteemed are Buskri, Bu Hafs, and Fukus. Popenoe stated that the Majhul date is found in Morocco. That so few varieties have been reported appears to be due to the fact that a great deal of the trade of the date district is with the tribes of the south and the export to Europe is less important, and also to the fact that travelling in the Tafilet district has been so unsafe that few Europeans venture there. As far as the present writer is aware, only one Englishman, a correspondent of a London newspaper, penetrated to this spot, before its occupation by the French in 1917.

ALGERIA

In 1851, when in Timbuktu, Barth mentioned two varieties of dates to be found in the Tuat oases. Arnaud, in 1906, listed various Algerian varieties of date palms, but the present writer has been unable to consult his original paper. Barth, Watt, Swingle, Sommerville, Kearney, and Popenoe, however, listed between them the following thirty-eight varieties. The spelling adopted in this table and in subsequent tables is that used in the original descriptions.

TABLE I.

THE VARIETIES OF DATE PALMS OF ALGERIA

No.	VARIETY.	SYNONYMS.	AUTHORITY.
1	ABDUL AZIZ	.. ..	Kearney
2	ALI RASHID	.. ..	K.
3	AMAREE	Ammary, Amari, Ammaree ..	Swingle
4	ASAB' AL AROOS ..	Sba El Aroosa	Popenoe
5	AUSHEH	Aooshet, Aujeh	P.
6	AYATA	.. ..	Watt
7	AZMASHI	.. ..	P.
8	BENT KEBALLA ..	Bint Qabaleh	S.
9	BOU ARUSSA	.. ..	K.
10	DEGLET BEIDA ..	.. ..	K.
11	DEGLET NOOR	Deglet en nour, Deglat ennour ..	S.
12	GUERN EL RHEZAL ..	Qurn Al Ghazal	K.
13	GUETTARA	.. ..	K.
14	HALOOA	Halwa	S.
15	HAMRAYA	Hamra	S.
16	HORRA	Hourra, Harra, Herra, Hurra ..	K.
17	ITEEMA	Ytima	K.
18	KASBEH	.. ..	P.
19	MAJHUL	.. ..	P.
20	MASHI DEGLA	.. ..	P.
21	MASIDHEH	.. ..	P.
22	MASSOWA	.. ..	K.
23	MAZARRAF	.. ..	P.
24	M'KENTICHI DEGLA ..	Makantishi, Kenteeshy, Kentichi ..	K.
25	NAKHLEH ZIANEH ..	.. ..	P.
26	RHARS	Rharzi, Ghazi	S.
27	RISHTA	.. ..	P.
28	TAFAZWEEN	Tafazwan	K.
29	TAKERMEST	.. ..	K.
30	TANTABOOSHT	Tantaboucht, Tantabusht	K.
31	TASER SEIT	Tazizant	K.
32	TEDALLA	Teddala, Tadala	S.
33	TEDMAMA	.. ..	S.
34	TENNESSIN	Tenaseen, Tanessin, Tenassine ..	S.
35	THURI	.. ..	P.
36	TIMFUHAST	.. ..	P.
37	TIMJOOERT	.. ..	S.
38	TIN AKHOR	.. ..	Barth
39	TIN ASER	.. ..	B.
40	ZUMREH MIMUN ..	.. ..	P.

The above table contains the name of the celebrated DAGLAT NUR date, on the excellence of which a great deal of praise has been lavished. In the opinion of many people, however, this date as it arrives in England is inferior in flavour to the less well-known KHADHRAWI of the 'Iraq, which is imported in less attractive packages.

It will be noticed that there are many synonyms, caused largely by the difficulty of transliterating from the Arabic, a language usually written without the aid of short vowel letters and possessing twenty-eight consonants, but also by variations in the acuteness of hearing in the inquirers. Thus date No. 8 is spelt by Swingle with the *Kaf*, but by Popenoe, more correctly, with the *Qaf*. The *Ghain* sound has also given difficulty: Swingle and Kearney have followed the French, whose *R* is more gutteral than the English, in writing date No. 26 *Rhars*, whereas Popenoe, more correctly, according to English speech, writes it *Ghars*. But it is the vowels which present the greatest difficulty in writing Arabic names in Roman script, and there does not appear to be agreement even between experts in this matter. As far as possible in this memoir, the names of dates grown outside the 'Iraq are given in the spelling used in the original description of the date. The names of those 'Iraq varieties described by the present writer are transliterated as far as possible in accordance with the system adopted by the present government of the 'Iraq. The majority of the names, however, were heard from the lips of illiterate garden owners, so that it is possible that the spelling of some may be inaccurate.

TUNISIA

The dates of Tunis have long been famous. Indeed, so exaggerated were the tales told of the extent of its gardens that the mediaeval geographers showed a large part of the Great Sahara as occupied by the Jerid. Nowadays, the extent of Tunisian date gardens is known, and the varieties of dates to be found there seem to have been studied more than those of any other region. The reason, perhaps, is that the district is comparatively small, is near the sea-coast, and is not cut off therefrom by any natural barrier, as happens in Morocco, Algeria and in Tripoli. In 1889, H.B.M. Consul in Tunis mentioned the date trade of this region, and named as the best variety the DEGLA. It may be presumed that he meant the DAGLAT NUR. In 1893, de Clam listed seventy-four varieties; and, in 1900 and 1904, Swingle alluded to four. In 1901, Masselot published his list of ninety-four; and, in 1906, Kearney listed sixty-three. In 1909, Jeangérard described the dates of Nefzaoua; and, in 1913, Popenoe included in his book descriptions of seventeen varieties. The present writer has not been able to consult the original papers of de Clam, Masselot, and Jeangérard, so that the authorities for the following table are Swingle, Kearney and Popenoe.

TABLE II.

THE VARIETIES OF DATE PALMS OF TUNISIA

No.	VARIETY.	SYNONYMS.	AUTHORITY.
1	AMMARY		Kearney
2	ANGOO		K.
3	ARESHTEE	Areshty, Arichti	Swingle
4	SBA AROOSA	Sba El Aroosa, Asab' Al Arus	K.
5	BAYDH HAMMAM		K.
6	BAYJOO	Badjou	K.
7	BENT SEGNY		K.
8	BESSER HALOO	Bisra Haloua	K.
9	BOO AFFAR		K.
10	BOO FAGOOS	Boo Fagous, Bou Feggouss	K.
11	CHEDAKH		K.
12	DEGLAOUI (Male)		S.
13	DEGLET BARCA		K.
14	DEGLET CAID		K.
15	DEGLET HAMIDATOO		K.
16	DEGLET HASSEN		K.
17	DEGLET NOOR		K.
18	DEGLET SENNAYGA		K.
19	DENGUI		K.
20	DOONGA	Denanga	K.
21	FTEEMY	Ftimi	K.
22	GASB HALOO		K.
23	GASBY		K.
24	GOONDY		K.
25	GUERN EL RHEZAL	Qurn Al Ghazal	K.
26	HALOOA BAYDA		K.
27	HALOOA HAMRA		K.
28	HAMRAYA	Hamra	Masselot
29	HORRA	Hourra, Harra, Herra, Hurra	K.
30	ITEEMA	Ytima, Yatima, Itima	K.
31	KAROOY		K.
32	KENTA	Kanta	K.
33	KENTEESHY	Kentichi, M'Kentichi Degla	K.
34	KHADHRAYA		K.
35	KHALT BOO FAGOOS		K.
36	KHALT DEGLAOWIA		K.
37	KHALT GAMA		K.
38	KHALT HAMEED		K.
39	KHALT HORRAOWIA		K.
40	KHALT KABEER		K.

TABLE II.—*continued*

THE VARIETIES OF DATE PALMS OF TUNISIA

No.	VARIETY.	SYNONYMS.	AUTHORITY.
41	KHALT KENTAWIA ..	.. ..	K.
42	KHALT MENAKHRY ..	.. ..	K.
43	KHALT MOOASHEM ..	.. ..	K.
44	KHAROOBY	Kharroubi	K.
45	KSEBA	Kasbeh	K.
46	LAGOO	Laqu	K.
47	LEMSY	.. ..	K.
48	LOOZEE	.. ..	M.
49	MENAKHER	Monakhir, Menakhir	S.
50	MOKH BEGRY	Moukh Begri	K.
51	OKHT AMMARY	.. ..	K.
52	OKHT FTEEMY	Oukht Ftimi	K.
53	REMTA	.. ..	K.
54	RHARS	Rhars Mettigui, Ghars, Gheress ..	K.
55	RISHTA	.. ..	Popenoe
56	SAYBA BOO DRA ..	.. ..	K.
57	SELATNY	.. ..	K.
58	TAFAZWEEN	Tafazaouine, Tafazwan	K.
59	TANTABOOSHT	Tantaboucht, Tantabusht	K.
60	TENASSEEN	Tanessin, Tenassine, Tanasin ..	K.
61	THABY	Dzhabi	K.
62	TOWADANT	.. ..	K.
63	TOZER ZAID KHALA ..	.. ..	K.
64	TOZER ZAID SAFRA ..	.. ..	K.
65	TRONJA	Troundja, Turunja	K.
66	ZEKRY	Zech.i	K.
67	ZRAI	.. ..	K.

TRIPOLI

The oases grouped around Murzuk are the chief date gardens of the Tripolitaine. The Fezzan, however, is a comparatively unknown region, traversed by but few Europeans. Denham and Clapperton in 1824, Richardson, Overweg and Barth in 1850, Barth again five years later, and Rohlfs in 1865 are amongst the more famous of these; and of them Richardson alone appears to have studied the date palms. He listed forty-six varieties, and

added very brief descriptions of their dates. The *Encyclopædia Britannica* states that in the oasis of Murzuk alone there are thirty varieties. The explorers of the United States Bureau of Plant Industry have not penetrated this region, and concerning it French tropical agriculturists are silent. Other parts of the country, however, have been studied from time to time by:—Lyon in 1849, Dickson in 1853 and 1854, Vogel in the latter year, Duveyrier in 1861, and Forbes in 1921.

TABLE III.

THE VARIETIES OF DATE PALMS OF TRIPOLI

No.	VARIETY.	SYNONYMS.	AUTHORITY.
1	AGHLEEN'		Richardson
2	AMO'UWEE		R.
3	AM'REER		R.
4	EL AMZOUGH		R.
5	ASBA' AROUS		R.
6	AUREGH		*En. Brit.*
7	EL BEE'YOUTH		R.
8	BOR'NEE		R.
9	EL FA		R.
10	FER'TAKOU		R.
11	EL HA'FALEE		R.
12	HAJA'B		R.
13	HAMA'J		R.
14	JINFAK'H		R.
15	EL KADEE'R		R.
16	EL KAMA'R		R.
17	EL KARA'FES		R.
18	EL KARATA'WEE		R.
19	EL KAUB		R.
20	EL KERBA'OU'WEE		R.
21	EL KHATHAR		R.
22	EL KOKA'EE		R.
23	EL KOUWEE'YAF		R.
24	LA'GHOU'L		R.
25	LOO'REE'K		R.
26	LOU'KA'LEE		R.
27	MAKA'RESH		R.
28	MAKMAK		R.
29	NAFOUSH		R.
30	NA'FZA'WEE		R.

TABLE III.—*continued.*

THE VARIETIES OF DATE PALMS OF TRIPOLI

No.	VARIETY.	SYNONYMS.	AUTHORITY.
31	OMM'-ELLS-THIHA'B		R.
32	SABIE'R		R.
33	SALOULOU		R.
34	SALOUM'		R.
35	SHA'RAN		R.
36	SUNA'L		R.
37	EL SUNBI'LBI'L		R.
38	TAGHAIAT		R.
39	TAGHEDSHAH		R.
40	TA'IB		R.
41	TAI'B BELA'H		R.
42	TA'KADAF		R.
43	TALUS		R.
44	EL TA'MES'KAL		R.
45	TASFER'T		R.
46	THAHABEE		R.
47	TILLIS		*En. Brit.*
48	TOUA'TEE	Tuati	R.

EGYPT

Only twenty-nine varieties of date palms have been reported from Egypt, a number which is surprisingly small. Possibly the explanation is to be found in Mason's remark that of the six million taxed palms two-thirds are seedling types. This indicates a low standard of cultivation, and it may be inferred that little trouble is taken to introduce new varieties by propagating desirable chance seedlings. The first variety of date reported from Egypt seems to have been the HAYANI, mentioned in 1871 by Delchevaleries under the name of BIRKET AL HAJJI. In 1901, Swingle alluded to five varieties, and in the same year Bonaparte published brief descriptions of the fruit of twice that number. Eight years later, Beadnell mentioned one variety. Paoletti in 1912 described the fruit of eleven kinds. In 1913 Popenoe described the fruit of eleven varieties, and in the same year Eisen described one variety. In 1914, Willcocks, F. C., spoke of one variety, and in Mason's paper of the following year there are described twenty palms and their fruit.

TABLE IV.

THE VARIETIES OF DATE PALMS OF EGYPT

No.	VARIETY.	SYNONYMS.	AUTHORITY.
1	AGLAWY	Aglany (?)	Willcocks, F. C.
2	AMHAT	Amahat, Emahat	Bonaparte
3	AMRI	Amry, Amiri, Amreeyah	Bon.
4	BARONIAD	El Barniad, Barinad	Paoletti
5	BENTAMODA		Mason
6	BINT AESCHA	Bint Aischa, Bent Aescia	Bon.
7	BURLOS		Popenoe
8	DAKAR MAJAHEL (Male)		Swingle
9	FALIG		Beadnell
10	FRIHY		M.
11	GAZALY		M.
12	GONDEILA		M.
13	HAYANI	Haiani, Birket Al Hajji	S.
14	HAMRAWI		M.
15	IBRIMI	Barakawi, Sukkoti	Bon
16	KOBI	Kaiby (?)	M.
17	NAJL AL PASHA	Nakhlet Al Pasha (?)	Pop.
18	NAN EL DIN		Pao.
19	RACHIDI	Rashedi, Rashidi, Samany, Samani	Bon.
20	RAMLI		Bon.
21	RUHM AL GHAZAL		Pop.
22	SAFRA EL AUESCI		Pao.
23	SAIDI	Wahi, Saidy	S.
24	SEEWAH	Siwi, Sewi, Sini, Siwah	S.
25	SULTANI	Sultany	Bon.
26	TAMR		M.
27	TKESA		Pao.
28	WEDI		M.
29	ZAGLOOL	Zaglul, Zaclul, Zaghloul, Zaghlool	Bon.

THE SUDAN

Date palms in the Sudan also do not appear to be so well cultivated as in Algeria and Tunisia, and the number of reported varieties is small. In 1881, T. Fischer spoke of two varieties, and the *Bulletin* of the Imperial Institute in 1911 referred to two also, and in 1915 added three. Bonaparte mentioned CONDEILA in 1912, and Popenoe in 1913 also alluded to it. Mason described the palms and dates of eight varieties, and Bevan in 1919 noted two.

TABLE V.

THE VARIETIES OF DATE PALMS OF THE SUDAN

No.	VARIETY.	SYNONYMS.	AUTHORITY.
1	BARTAMODA	Bertamoda, Bertamouta, Bentamoda	Popenoe
2	CORRAGIA	.. ..	Mason
3	DEGLET EL NUR (*Experimental*)	.. ..	Bul. Imp. Inst.
4	GARBAN	.. ..	B.I.I.
5	GUNDILA	Gondeila, Condeila	P.
6	IBRIM	Ibrimi, Barakawi, Sukkoti ..	Fischer
7	JAOW ISWOD	.. ..	M.
8	JAOW OBIAD	.. ..	M.
9	KOSHA	.. ..	M.
10	KULMA	.. ..	M.
11	MONAKHIR (*Experimental*)..	.. ..	B.I.I.
12	SULTANI	.. ..	F.

CYPRUS

The cultivation of the date palm is not a very important industry in this island, and up to the present only four varieties have been reported. These are BALCHIK, KOURMOUZOU, PHOUNTOOR, SARAIH (Bevan, 1919).

ARABIA

It is eloquent of the difficulties the traveller encounters in this fascinating country that the date palm of Arabia, the principal crop of its inhabitants, should have remained almost unstudied. Burckhardt (1829) and Burton (1855) provide the information concerning Hejazi varieties and Doughty (1875) mentions four varieties of the interior. Palgrave (1866) panegyrises two sorts of Hasa dates, and to these the author has added ten, the names of which he heard from Arab travellers when he was at Fao in 1919. Of the ten Hadramaut varieties listed, six are those found by the author during a brief visit to Aden in 1920, and the remaining four were reported by Arab gardeners to be present, but were not seen. Popenoe (1913) travelled in the hinterland behind Muscat and described in his book the dates of fifteen kinds. Fairchild (1901) mentioned some Oman varieties. He did not see the palms, but only preserved specimens of the dates.

TABLE VI.

THE VARIETIES OF DATE PALMS OF ARABIA

No.	VARIETY.	SYNONYMS.	AUTHORITY.
	HEJAZ.		
1	AJWAH	.. ..	Burton
2	BIRNY	Birni	Burckhardt
3	DJEBELY	.. ..	Burck.
4	DOUM	.. ..	Burck.
5	HELEYA	Hilayah	Burck.
6	HELOUA	Hilwah, Halwa	Burck.
7	KHUZAYRIYEH	.. ..	Burt.
8	LAUN	.. ..	Burt.
9	SYHANY	Sayhani	Burck
10	SHELEBI	Jalebi	Burt.
11	WAHSI	.. ..	Burt.
	HADRAMAUT.		
1	BASRAWI	Ista'amran	Dowson
2	GAHARA	.. ..	D.
3	KHADHRAWI	.. ..	D.
4	KHDUHARRI	.. ..	D.
5	KISHRA	.. ..	D.
6	MADINI	.. ..	D.
7	MAQSAB	Halawi	D.
8	SHAHARI	.. ..	D.
9	TUBAIQI	.. ..	D.
10	ZARIQI	.. ..	D.
	OMAN.		
1	BATNA	.. ..	Fairchild
2	BU NARINJA	.. ..	Popenoe
3	BURNI	Berni	F.
4	BURSHI	.. ..	P.
5	FARD	Fardh	Swingle
6	HELLALI	Hilali	F.
7	KHALASEH	.. ..	P.
8	KHANEZI	Khanayzi	F.
9	KHASSAB	.. ..	F.
10	MUBSALI	.. ..	F.
11	MUZNAJ	.. ..	P.
12	NAGAL	Naghal	F.

TABLE VI.—*continued.*

THE VARIETIES OF DATE PALMS OF ARABIA.

No.	VARIETY.	SYNONYMS.	AUTHORITY.
	OMAN—continued.		
13	QUSH BATASH	.. ..	P.
14	QUSH FARFARA	.. ..	P.
15	QUSH HASAS	.. ..	P.
16	QUSH SHAHIN	.. ..	P.
17	QUSH ZABAD	.. ..	P.
18	SARNA	.. ..	P.
	HASSA.		
1	AWAIDI	.. ..	Dowson
2	BOBAK	.. ..	D.
3	DUWAICH	.. ..	D.
4	HASAWI	.. ..	D.
5	IZDAIFI	.. ..	D.
6	KAIRA	.. ..	D.
7	KHALASEH	Khalas, Khlas	Palgrave
8	KHINAIZ	.. ..	D.
9	REKAB	.. ..	Pal.
10	RAZAIZ	Jozi	D.
11	SHABIBI	.. ..	D.
12	SWAIDAN	.. ..	D.
	SHAMAR and NEJD.		
1	BERNI	.. ..	Doughty
2	HELW	.. ..	Dou.
3	SHAGRA	.. ..	Dou.
4	S'WEYFLY	.. ..	Dou.

PERSIA

It is remarkable that the varieties of dates of the important date producing regions of Persia should have been so little studied by Europeans. The varieties of the vast stretch of date gardens from Mohammera to the head of the Persian Gulf appear to have been reported upon by no botanist or traveller interested in dates. In 1919, when the present writer was studying the conditions under which dates are grown on the Shatt Al 'Arab, he had to confine his attention to the territories of the 'Iraq. However, from the reports of the garden owners of the neighbourhood, it cannot be doubted

that that part of Persia which borders this river produces the ISTA'AMRAN, HALAWI, KHADHRAWI, DAIRI, and ZAHIDI palms. From information received from a gardener and a ship-chandler, Fairchild gives the following varieties from southern Persia:—FARD, GARDIWAHL, HALAWI, KHAROO, MURDASING, NIMKADAMI, SHAKARI, and ZAREK.

INDIA

Although the date palm is cultivated over a considerable area in Sindh and the Punjab, especially near Multan and Muzaffargarh, in the Sindh Sagar Doab and trans-Indus territory, near Dera Ghazi Khan, at Saharanapur and Bundelkhand, and here and there in the Ganges Doab, and in the Dekkan and Guzerat (Brandis); yet nothing appears to have been published concerning the varieties to be found. Fairchild gives a list of twenty-three varieties from Baluchistan, but he did not see the palms.

TABLE VII.

THE VARIETIES OF DATE PALMS OF BALUCHISTAN

No.	VARIETY.	SYNONYMS.	AUTHORITY.
1	ABDANDON		Fairchild
2	BAGUM JURGHI	Bagum Junghi	F.
3	CHUPSHOOK	Trupshook	F.
4	CHURPAN		F.
5	DISHTARI		F.
6	DUNDARI		F.
7	GOND GORBUG		F.
8	GONZELLI		F.
9	HALLANI		F.
10	HASHNA		F.
11	HURSHUT	Hurshud	F.
12	JALGHI	Jalka	F.
13	KALARA	Kularu	F.
14	KHARBA		F.
15	KOROCH		F.
16	KORROO		F.
17	MOZARTY	Mazauty	F.
18	ROGANI		F.
19	SHAPEGO		F.
20	SHUKKERI		F.
21	SOONT GORA		F.
22	SUBZOO		F.
23	WASHCLONT	Washclunt	F.

THE UNITED STATES OF AMERICA AND AUSTRALIA

Above have been listed the names of varieties of date palms in their natural habitat, but large numbers of offshoots have been imported into the United States, so that now there are to be found there a great number of Old World varieties. McClatchie in 1904 reported that there were one hundred and five different kinds of date palms at Tempe. Some seedling dates also have been considered worthy of propagation, and of these Swingle mentions BENNET, KALES, LOUNT, and WOLFSKILL. Toumey adds BARTLETT. The date palm was introduced into Mexico by the Spaniards.

The only named variety which appears to have been introduced into Australia seems to be the DEGLET NUR.

Table VIII. Varieties of Female Date Palms of the 'Iraq.

No.	Shatt Al 'Arab.	Lower Tigris.	Upper Tigris.	Badrah and Jisan.	Lower Euphrates.	Upper Euphrates
1	—	—	—	—	—	AKHU KHASTAWI
2	—	—	—	—	—	ALIQA
3	—	—	'ALI MUSA	—	—	—
4	—	—	'AMIR HAJJ	—	—	—
5	—	—	—	—		'AMRAN
6	—	—	—	—	—	'AURA
7	'ASABIAT AL 'ARUS (QILAK 'ARUS)	'ASABIAT AL 'ARUS	'ASABIAT AL 'ARUS	'ASABIAT AL 'ARUS	—	—
8	AS-HAG	—	—	—		—
9	ASHGAR (SHAGRAH)	—	ASHGAR	—	—	—
10	ASHRASI (JASAB, ETCHRISIAH)	ASHRASI	ASHRASI	ASHRASI	ASHRASI	ASHRASI
11	'ATRI	—	—	—	—	'ATRI
12	'AWAIDI	—	—	—	—	—
13	—	—	BADRAIAH (JASAB, QASAB, QASP)	BADRAIAH	BADRAIAH	BADRAIAH
14	—	—	—	BAGLAH	—	—
15	—	—	—	BANI RA'BA	—	—
16	BARBAN (DIGAL JA'MA)	BARBAN	BARBAN	BARBAN	BARBAN	BARBAN
17	BARHI (BARHAB)	BARHI	BARHI	BARHI	—	—
18	—	—	BINAFSHAH	BINAFSHAH	—	—
19	BINT AL SA'BA	—	—	—	—	—
20	BRAIM	BRAIM	BRAIM	—	BRAIM	—
21	BUBAK	—	—	—	—	—
22	—	—	CHALABI ('ALI CHALABI)	—	—	—
23	CHIBCHAB (BUGHBUGH)	CHIBCHAB	—	—	CHIBCHAB	—
24	—	—	CHUPAN	—	—	—
25	DA'AILI	—	—	—	—	—
26	—	—	—	—	DACHWANI	—
27	DAIRI (MAISHI, TAIB AL 'ISM)	DAIRI	DAIRI	—	DAIRI	—
28	DIGAL	DIGAL	DIGAL	DIGAL	DIGAL	DIGAL
29	DIGAL 'ABAS	—	—	—	—	—
30	DIGAL 'ABD AL 'ALI	—	—	—	—	—
31	—	—	—	DIGAL 'ARUS	—	—
32	—	—	—	DIGAL HASUNI	—	—
33	—	—	—	—	DIGAL MIASI	—
34	DIGAL MUSA (BALJANI)	—	—	—	—	—
35	—	—	—	—	—	DIQWAINI
36	DUWAICH	—	—	—	—	—
37	—	—	—	—	—	FALAH
38	—	—	—	—	—	FARAKH 'ABAIDH
39	FARSI	—	—	—	—	—
40	GANTAR	GANTAR	GANTAR	—	GANTAR	—
41	—	—	GARGANI	—	—	GARGANI
42	—	—	—	—	HABABAH	—
43	—	—	—	—	—	HABRAH
44	HABSI	HABSI	—	—	—	—
45	HADAL	—	—	—	—	—
46	—	—	—	—	HAIRI	—
47	HALAWI	HALAWI	HALAWI	—	—	—
48	HALAIAH (HALWI)	—	—	—	HALAIAH	—
49	HAMRAWI (HAIMAR, HAMRAIAH)	HAMRAWI	HAMRAWI	HAMRAWI	—	HAMRAWI
50	HASAWI	—	—	—	—	—
51	HAWAIZ	—	—	—	—	—
52	—	—	—	—	—	HILWAT AL JUF
53	—	—	IBRAHIMI (FARAKH 'ASWAD)	—	IBRAHIMI	IBRAHIMI
54	ISTA 'AMRAN (SAIAR, SAI, AMRAN)	ISTA 'AMRAN	ISTA'AMRAN	—	ISTA'AMRAN	ISTA'AMRAN
55	—	—	—	—	—	JAFAILI
56	—	—	—	JAMAL DIN	—	—
57	—	—	—	—	—	JUHARAH
58	JUZI (JUWAIZI, RAZAIZ)	JUZI	JUZI	—	JUZI	JUZI
59	KHADHRAWI	KHADHRAWI	KHADHRAWI	—	KHADHRAWI	KHADHRAWI
60	—	—	KHAM AUFI	—	—	KHAM AUFI
61	KHASAB	KHASAB	KHASAB	KHASAB	—	—
62	KHASTAWI	KHASTAWI	KHASTAWI	KHASTAWI	KHASTAWI	KHASTAWI
63	—	—	—	—	—	KHATIBI
64	—	—	—	—	—	KHIARAH
65	KHINAIZ	—	—	—	—	—
66	KHLAS	—	—	—	—	—
67	LILWI	LILWI	—	—	—	—
68	—	—	—	LAI KATUNAH	—	—
69	—	—	—	—	MAJMUDAH	—
70	—	—	MAKAWI	—	—	—
71	MAXTUM	MAKTUM	MAKTUM	MAKTUM	MAKTUM	MAKTUM
72	—	—	—	—	—	MANAII
73	MIDAD	—	—	—	—	—
74	—	—	—	—	—	MUGANAHAH
75	—	—	—	—	MUMAK AL HAMRAH	—
76	—	—	—	—	MURRI (KHADHRAWI)	—
77	—	—	—	—	—	MUQATAB
78	—	—	—	—	NIRZI	—
79	NUKSH AL MUBRID	—	—	—	—	—
80	—	—	—	QITAZ	—	—
81	—	—	—	—	—	QIANI
82	—	—	SA'ADA	—	—	—
83	—	—	SAFRAWIAH (SAFRAIAH)	—	—	SAFRAWIAH
84	—	—	—	SAISANDALI	—	—
85	—	—	—	—	SALTANI	—
86	—	—	—	—	—	SHAGRAH
						MUBARAK
87	—	—	—	—	—	SHAMUS
88	SHIRANI	—	—	—	—	—
89	SHUKAR	SHUKAR	SHUKAR	—	—	SHUKAR
90	SHWAIDI (SHWAITHI)	—	—	—	SHWAIDI	—
91	SUKRI	SUKRI	SUKRI	—	—	—
92	SWAIDAN	—	—	—	—	—
93	TABARZAL	TABARZAL	TABARZAL	—	—	TABARZAL
94	—	—	—	—	—	TUFAHAH
95	—	—	UBAIDI	—	—	—
96	—	—	UKHT AL QASAB (UKHT BADRAIAH)	—	—	UKHT AL QASAB
97	—	—	UMM AL BAIDH	—	—	—
98	UMM AL BAKHUR	—	—	—	—	—
99	UMM AL DIHIN	—	—	—	—	—
100	—	—	UMM AL JAMUS	—	—	—
101	—	—	UMM AL KHIAR	—	—	—
102	—	—	UMM AL TUWAL (SABA' DHARA')	—	—	UMM AL TUWAL
103	—	—	UMM JAHARAH	—	—	—
104	—	—	—	—	—	URUMAIYAR
105	—	—	—	—	UWAIN TAYUB	—
106	—	—	—	—	—	ZADAD
107	ZAHIDI	ZAHIDI	ZAHIDI	ZAHIDI	ZAHIDI	ZAHIDI
108	—	—	—	—	—	ZARIQAH
109	—	—	—	—	—	ZARAIAH
110	—	—	—	ZUBAIR	—	—
Total 110	48	23	38	21	22	44

THE VARIETIES OF FEMALE DATE PALMS OF THE 'IRAQ

There are more date palms in the 'Iraq than in any other country of the world, and the number of different varieties is correspondingly large. In the two previous parts of this memoir there have been given the reasons for believing that the 'Iraq portion of the Shatt Al 'Arab date zone contains about 15,000,000 palms. Mr. F. L. Engledow recently told the author that, as a result of a careful investigation which he made in conjunction with the Political Officer at Hilla, he came to the conclusion that there were 5,000,000 palms along the banks of the Hillah Canal. The present writer would hazard a guess that there might be a million palms around Baghdad. There are immense groves at Shithathah and Rahaliyah; and the lower part of the Euphrates is lined with gardens. It is not unlikely that there are 30,000,000 palms in the whole country. These figures become more significant when compared with estimates of the palm population of other countries. According to the official census, quoted by Bonaparte in 1910, there are 10,002,267 date palms in Egypt. Kearney quotes estimates for Tunisia from 1,330,000 to 2,465,000, and these are repeated by Mason. Kearney also states that in 1899 the celebrated oases of the Oued Souf in Algeria contained 192,000 bearing palms. The world-famous oasis of Biskra contains only 150,000 date palms.

One hundred and thirty-two varieties of date palms have been recorded from the 'Iraq, and it is to be expected that that number will increase with greater opportunities for their study. The subjoined table of one hundred and ten varieties the author believes to be reasonably complete in so far as it deals with Shatt Al 'Arab and Lower Tigris varieties; but the list for the other regions of the 'Iraq are compiled from notes taken at odd moments during other activities, and hence by no means must they be regarded as final. Synonyms are placed in brackets below the name of the variety, and long vowels are underlined.

In the year 1873 Surgeon-Major Colvill wrote an interesting letter about the agricultural industry around Baghdad, and included therein a list of twenty-six names of female date varieties of that district. Of these, ten are unknown to the present writer, and have been included in the following table. In 1900 the Rev. Mr. Zwemer alluded to the following varieties of the Shatt Al 'Arab, HALLAWI (i.e. HALAWI), KHADHRAWI, SAYER (i.e. ISTA'AMRAN), ZEHDI (i.e. ZAHIDI), BEREM (i.e. BRAIM), DERY (i.e. DAIRI), SHUKRI, and

KHALASI (i.e. KHLAS), and reported that over thirty varieties are cultivated for local consumption. He adds translations of some varietal names, but does not give the Arabic originals: "Daughter of Seven" (BINT AL SABA ?), "Bride's Fingers" (ASABIAT AL ARUS?), "Sealed-up" (MAKTOOM?; the actual Arabic word for "sealed-up," however, is *makhtoom*: *maktoom* means rather "hidden" or "suppressed," as of anger), "Red Sugar" (?), "Little Star" (?), "Pure Daughter" (?). Fairchild, writing in 1901, listed two varieties which have not been identified by the present writer, and Popenoe's book includes the names of eight. Mr. Gautby, in 1919, reported LIEDI from Baquba, and Mr. G. S. Cameron, in 1921, told the author of the SHITAL date of Baghdad. The twenty-two varieties which have been reported by these observers, but which have not been seen by the author, are listed in the following table. Thus, the total number of varieties of female date palms hitherto reported from the 'Iraq is one hundred and thirty-two.

TABLE IX.

ADDITIONAL VARIETIES OF FEMALE DATE PALMS OF THE 'IRAQ REPORTED BY OTHER OBSERVERS

No.	VARIETY.	SITUATION.	AUTHORITY.
1	AMAMET EL KATHIE	Baghdad	Colvill
2	ANJASI	Bd.	Popenoe
3	BADINJANI	Bd.	P.
4	BAJLANI	Bd.	P.
5	BURNI	Bd.	Fairchild
6	DEBOENIEH (DUBAINI)	Bd.	C.
7	DUGAL BADAM	Bd.	C.
8	DUGLAT EL HATOON	Bd.	C.
9	DUGLAT HILWAH	Bd.	C.
10	EL WASHA	Bd.	C.
11	FINDUKIEH	Bd.	C.
12	HALAWI MAKKAWI	Bd.	P.
13	HASAN EFFENDI	Bd.	P.
14	HILALI	S.A.A.	P.
15	LIEDI	Baqooba	Gautby
16	MAKAWIEH AHMAR	Bd.	C.
17	MAKAWIEH ESHGAR	Bd.	C.
18	MUBSLI	S.A.A.	F.
19	SHITAL	Bd.	Cameron
20	SIN MUFTA	Bd.	C.
21	SUKHAR NABAT	Bd.	P.
22	TABASHIR	Bd.	P.

GENERAL REMARKS ON VARIETAL DIFFERENCES BETWEEN SHATT AL 'ARAB DATE PALMS

TOGETHER WITH A NOTE ON THE COMMERCIAL ASPECT OF THE DATE INDUSTRY.

In the first two parts of this Memoir, previously published, have been given the main facts concerning the habit, the cultivation, and the yield of date palms on the banks of the Shatt Al 'Arab; but it may be convenient here to recapitulate some of these in order that the following detailed descriptions of varieties may be appreciated the better.

From what has been said already, it will have been observed that date palm varieties differ widely amongst themselves, a notable instance of which has been provided by the notes already given on yield. For example, ZAHIDI palms yield over 100 lb. of *tamar* dates a year, whereas ISTA'AMRAN palms do not yield half that amount. Yield, however, is a character dependent upon a large number of factors, and is especially liable to environmental influence. It is, therefore, for purposes of classification, of little use. Other characters somewhat less variable have therefore been studied for this purpose; and, though these also, more especially the vegetative characters, are capable of very different expression under different conditions, yet, considered together, they provide a basis for varietal distinction.

Some palms, for example ZAHIDI, grow quickly and vigorously, while others, for example KHADHRAWI, are of slower and less vigorous growth. The trunk of the full-grown palm may be slender, as that of ISTA'AMRAN, or stout, as that of BARHI; the old leaf-bases may weather down readily, as those of GANTAR, giving the old trunk a smooth appearance, or they may remain prominent throughout the life of the palm, as in the case of HALAWI.

The appearance of the fronds varies greatly in different varieties. Palms growing in favourable situations will produce more and longer fronds than those stunted owing to an unfavourable environment; but, on comparing the fronds of two varieties, for example HALAWI and KHADHRAWI—both grown under optimum conditions—it will be found that those of the former are invariably longer than those of the latter. A well-grown KHIKRI male palm would produce fronds both longer and more numerous than either of these.

The length of the pinnae seems to be correlated positively with the length of the petiole, but insufficient evidence was collected by the writer

for any definite statement to be made. In this connection, Mrs. Arber's valuable paper on the phylogeny of the monocotyledonous leaf, in the 1922 April number of the Journal of the Royal Society, is interesting. Mason, in the bulletin already quoted, has pointed out the varietal variation in the angles subtended by the pinnae and the axes of the petiole, but this method of differentiating between varieties of date palms appeared to the present writer to be too complicated to be generally useful.

The proximal, or basal, part of the date palm frond bears long sharp spines instead of pinnae. These spines may be said to be morphologically pinnae. Some varieties, for example male palms generally, and ZAHIDI, are very well provided with long and stout spines, but some, for example HALAWI, have but few. Other varietal differences observable in the frond are the colour and size of the base. In HALAWI and BARHI for example, the base is large, and in ISTA'AMRAN and KHADHRAWI it is small. Both characters are very variable, but they are useful when considered in conjunction with other characters. Green is the commonest colour, tending towards yellow in ZAHIDI and black in ISTA'AMRAN. A useful diagnostic feature in palms is the general habit of the fronds, erect, drooping, bunched, scattered, "shock-headed," or graceful. Though only of arbitrary value, this feature of the plant habit, best seen in silhouette, is distinctive of each variety. ISTA'AMRAN fronds are short and stiff and bunched together; those of KHADHRAWI are even shorter, but are less stiffly arranged; ZAHIDI fronds also are rigid, but are long and numerous, giving the palm an appearance of great vegetative vigour; HALAWI palms bear fewer fronds than ZAHIDI, and, though they are nearly as long, they are borne less stiffly; but the most graceful of all fronds are those of DAIRI, which are thin, sway freely in the wind, and are provided with many long, narrow pinnae. Some fronds, instead of being only slightly curved throughout their length, have, in addition, a much more pronounced curvature near the apex. This is especially noticeable in the HADAL variety, and, to a less extent, in the MAKTUM. As new leaves are formed at the growing point of the palm, the old ones at the base of the "head" wither and hang vertically downwards until cut off. Such dying fronds hanging from the palms are illustrated in Plates XII. and XXIII. That the palms of the Punjab frequently have an untidy and ragged appearance compared with those of the 'Iraq is due to the fact that in India the pruning of the palms receives less attention.

The characters of the date fruit are more constant than those of the date palm, but the former also undergo wide fluctuations. Thus, ISTA'AMRAN dates may vary in length from 1 to 2 inches. However, in spite of this variation, size is a useful distinguishing character. AWAIDI and SWAIDAN dates are the biggest, being nearly $2\frac{1}{2}$ inches in length when well-grown, and LILWI, the smallest, being about $\frac{1}{2}$ inch in length. Shape, too, differs between

variety and variety. LILWI are almost spherical, while 'ASABIAT AL 'ARUS are very long and narrow. Dates also vary in colour. The very young fruit (in Arabic *chimri*) are always green, but in the next stage (in Arabic the *khalal*) they may be of various shades of yellow (HALAWI) or of red (DAIRI) or of yellow flushed with red (BRAIM). The colour of the *khalal* is a very constant character, and it is therefore valuable for purposes of classification. Dates in the third stage, at the ripening of the fruit, when the apices have become soft and moist (in Arabic *ratab*) are usually intermediate in colour between those in the *khalal* stage and the final, or *tamar*, stage. *Tamar* dates vary in colour from amber (BADRAIAH) through a multitude of browns, blues, violets, and purples to black (AWAIDI). There is a wide range in the flavour and in the consistency of the flesh of dates. Some melt in the mouth like butter, for example AS-HAG, while others, for example ZAHIDI, have much fibre, or "rag" (to adopt the term of the citriculturists). Some *tamar* dates are dry, as DAIRI, while others, for example SHUKRI or AS-HAG, preserve their moisture for a much longer time. In 'Iraqi dates there is every gradation of moistness from the quite dry BADRAIAH to the very sticky AS-HAG; and, as a general rule, the longer *tamar* dates are allowed to remain upon the palm the drier they become, so that in some cases it is not easy to state definitely whether a certain date variety belongs to the wet or to the dry class. Also, those palms growing in damp situations produce moister dates than those of the same variety growing in drier places. However, on the Shatt Al 'Arab, really dry dates are rare, and even those varieties which in other parts of the 'Iraq exhibit the dry character here tend to be moist. From soft, sticky dates may be expressed a syrup of pleasant flavour, called by the Arabs *dibis*. Different varieties of dates produce differently flavoured *dibis*; and that of the better kinds commands a higher price than that of the inferior. The *chimri* of one variety only, the SHIRANI, are edible, because of their freedom from soluble tannin. As a rule, the tannin remains in a soluble condition unti the complete ripening of the date, that is, until the *tamar* stage is reached, though there are some varieties in which the percentage of soluble tannin decreases rapidly enough for the *khalal* to be eaten, for example BARHI. Apparently the fixing of the tannin in an insoluble condition is brought about by the liberation, from the protoplasm, of an enzyme (or by the splitting off of some side-chain). This normally occurs on the death of the cell, that is to say, on the ripening of the date; and it may be induced artificially by cooking. This method, which is described below, is employed on a large scale only in the case of BRAIM dates.

Arabs are wont to classify dates as they sometimes do drugs and other things into "hot" and "cold." These terms appear to mean little more than "indigestible" and "digestible." More "cold" dates than "hot" can be eaten without producing a feeling of internal discomfort.

DIGAL palms, that is to say seedlings, and hence palms of unknown ancestry, are of no distinctive variety; and, as far as is known, they may present any combination of characters. The subject of linkage in the inheritance of date palm characters, however, is one about which nothing whatever is at present known.

The commercial aspect of the date palm industry is one with which the present writer is not qualified to deal, but the following observations appear to be well established. Dates are the most valuable article of export from the 'Iraq, but the demand for them seems to be growing only in the United States. In the United Kingdom, the country which consumes most of the Persian Gulf dates, the demand is more or less stationary and there is considerable competition with the more expensive North African varieties which are repacked attractively at Marseille for export to the British Isles. Two main causes seem to prevent the rapid expansion of the British date trade; firstly, the high price which has to be paid to the growers on the Shatt Al 'Arab; and, secondly, the fact that the dates pass through several hands between the producer and the consumer. With regard to the former, the high price paid for dates appears to be due partly to the fact that many of the less well-known packers are also money-lenders, who pack gratis, making their profits out of the high interest charged on money lent to the garden owners or their tenants long before the harvesting of the crop, on which, at the time of arranging the loan, they secure the option of purchase at a low figure. Thus, by harvest time, there is only a portion of the crop not ear-marked for particular packers, and the competition to secure this is keen. With Jew, local Christian, Moslem and various Asiatic bidders, effective combination to reduce prices presents many difficulties. During the 1922 date season, however, a greater unity amongst buyers has been observable, although the prices paid, especially for HALAWI, have been high.

With regard to the second cause, the packers and the shippers to the United Kingdom are often different firms, and the importers to this country usually sell to the larger distributors who supply the retail trade. In America, however, the whole trade and the whole process from the packing upwards is in the hands of one firm. It is thus easier for a great advertising campaign to be organised; and such a campaign is now being waged there with much success. An entertaining film of the cultivation and the harvesting and the exporting of the date is being shown widely; and most magazines and papers contain advertisements extolling the many excellencies of the date as a food. Consequently, the demand for dates (HALAWI) in the States is large and increasing. They are packed on the Shatt Al 'Arab in wooden boxes containing 68 lb. net; but a large part of the American consignment on its arrival at the port is steamed and repacked in attractive, three-layered, ten-ounce cartons.

DETAILED DESCRIPTION OF THE VARIETIES OF FEMALE DATE PALMS OF THE SHATT AL 'ARAB

1. 'ASABIAT AL 'ARUS

GENERAL.

At Badra, this palm is called by the name of QILAK 'ARUS, where *qilak* is said to have the same meaning as *'asabiat*, i.e. fingers. The name in English would be "Bride's Fingers," and the palm is said to be so called because of its long, narrow, tapering dates. Richardson mentions a variety of the same name in the Fezzan, but, rather curiously, translates it "Bridegroom's Fingers."

There are only a few palms of this variety to be found in the Shatt Al 'Arab district, a few at 'Amarah, and rather more at Badrah and Baghdad. They have not been reported from the Euphrates. It is a rare, but well-known date.

Khalal dates are esteemed a delicacy by Arabs and by those Europeans who have become accustomed to them. The dates of those varieties which are sweet and not astringent in this stage are generally sold before they ripen fully, especially if the variety happens to be rare, and, consequently, its dates unsuitable for sale in bulk to export merchants who usually deal only in the four main varieties. Hence, 'ASABIAT AL 'ARUS dates are disposed of most frequently in the *khalal* stage at the local markets. Should any of the dates be allowed, owing to an oversight or other cause, to remain upon the palm until the *tamar* stage be reached, then they are packed with ISTA'AMRAN. The dates of this variety in the clusters do not ripen evenly as a rule.

THE PALM.

The trunk is stout; the fronds are many, long, drooping at the tips, and their bases of medium size and green; the leaflets are many, long, wide, and drooping; and there are many, long spines.

THE FRUIT.

The date is of the soft type. That is to say the *tamar* are moist, easily crushed under pressure. 'ASABIAT AL 'ARUS dates are not so long and tapering as the poetic imagery of their Arabic name might lead one to suppose;

PLATE I. A Thirty Year Old 'ASABIAT AL 'ARUS.

PLATE II. A Twenty-five Year Old As-HAG Palm.

but, nevertheless, they are nearly the longest of dates and are not wide. SWAIDAN and AWAIDI are the only dates which are longer, but they are also much wider. The colour of the *khalal* is orange yellow, of the *ratab* red brown, and of the *tamar* purple black. The *khalal* are not particularly astringent, are sweet and very juicy, but rather flavourless, and the *tamar* also are poorly flavoured, though soft and moist. The stone is long and narrow with a deep ventral channel.

2. AS-HAG

GENERAL.

The fame of this very rare palm rests on the exceeding richness of its *tamar*. A few palms only are to be found in the Shatt Al 'Arab date gardens, but this variety is well known. Its presence has not been reported from outside this region. The yield is said to be low, and those palms which were seen bore but little fruit. This date is not to be found in the open market: its scarcity and the richness of its flavour cause it to be found only at the table of the rich garden owner.

THE PALM.

The trunk is stout and the many fronds are stiffly borne, so that the palm has a masculine appearance, though the spines are few and short.

THE FRUIT.

The fruit is of the soft type, and is rather bigger than the common HALAWI, which it resembles in shape. That is to say, it is a long date with a wide base and a pointed apex. As is the case with most dates, the *tamar* are less definite in shape than the *khalal* and *ratab*. The colour of the *khalal* is an exquisite lemon yellow, tinged on one side with rose, in which feature it resembles BRAIM dates, though the yellow of the latter is more evenly suffused with the rose colour. The *tamar* are light purplish brown, and bear a conspicuous bluish bloom like that of the best ISTA'AMRAN. The *khalal* are very astringent, and the *ratab* of indifferent flavour, but the *tamar* are as rich as cream, as sweet as honey, and as soft as butter in the mouth. Of "rag" there is none, and the stone is comparatively small. The skin is thin, loose and wrinkled, and the fruits in consequence probably would spoil if packed without special precautions.

3. ASHGAR

GENERAL.

A single palm is called SHAGRAH. The words *ashgar* and *shagrah* are used for a chestnut horse and mare respectively (in 'Iraqi Arabic the "G" sound being used instead of the "Q"), and it is possible that the colour of the

date has earned it its name; but it is equally possible that the date has earned this name owing to its sweetness, for the Arab of Basra incorrectly pronounces the word for "sugar" *shakkar*.

This variety is remarkable for its early and excellent *ratab*. These are picked off the palm as they ripen and are eaten by the garden owner and his family. The number of ASHGAR palms is too few and their yield too scanty for their produce to be seen in the market.

THE PALM.

The fronds are many and long, and droop but very slightly at the extreme tip. Their colour is black at the base and the green colour is reached through a yellowish area where the many, long spines are borne.

THE FRUIT.

The colour of the *khalal* is yellow. The *ratab* are remarkably sweet and juicy. *Tamar* dates were not seen by the writer.

4. ASHRASI

GENERAL.

In the Basra market, the dry ASHRASI dates usually are called JASAB or CHASAB of QASAB; at Amarah, Kut, Badrah, and Jisan this variety, as well as ZAHIDI and BADRAIAH are called by the above names; but further north only the BADRAIAH is so designated. The word variously pronounced means merely "hard," "tough," or "dry," and in each district the principal dry date varieties acquire this name.

ASHRASI dates are well known in the local bazaars as dry, well-flavoured *tamar*, meet to be carried loose on a journey. There are not many palms of this variety on the Shatt Al 'Arab, and they are not much more common at Amarah; but at Badrah, and on the upper Tigris and the upper Euphrates, they may be found in most gardens. Four palms, the *ratab* dates of which were weighed in 1919, yielded an average of 61 lbs. each, and this amount appeared to be accepted by the owners of the palms as the average which might be expected from this variety.

This date is not exported, but has a large local sale. It is the commonest date to be split open and to have substituted for the stone an almond or a half walnut. Such prepared dates can be found only in the larger markets. There is also a considerable consumption in the *ratab* stage. These were selling on the stalk at Basra (1/10/19) at 13Rs. a *man* of 152 lbs. Three months later, at Amarah, dry ASHRASI could be bought in the market for 30Rs. an Amarah *man* of 1 cwt. In January, 1920, at Baghdad, the *tamar* were being sold at 30Rs. a *wazna* of 224 lbs.

PLATE III. A Twenty-five Year Old ASHGAR. (Note the bunch stalks from which most of the dates have been removed and on which may be seen a few *khalal* left to ripen.)

PLATE IV. ASHRASI Palm bearing *khalal*.

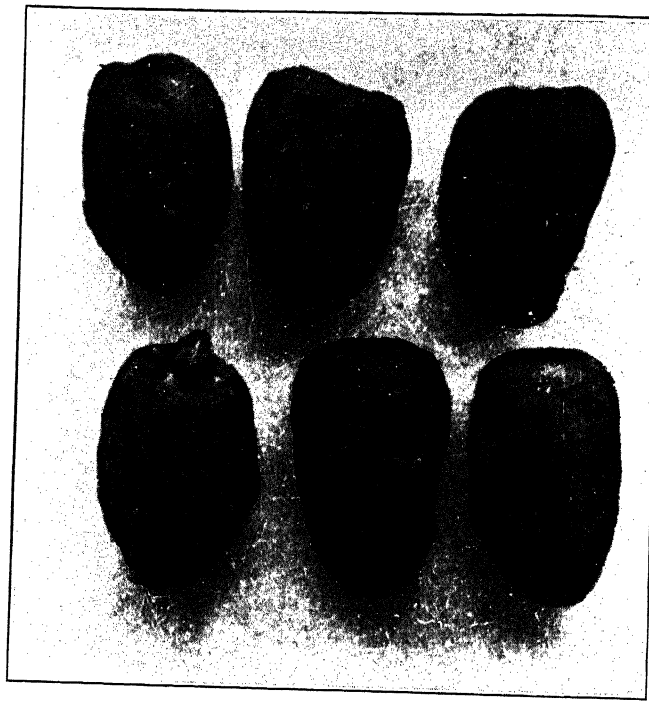

PLATE V. ASHRASI *Tamar*. (Natural size.)

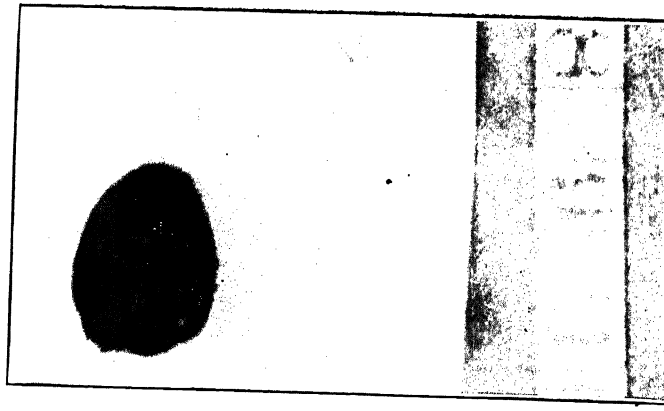

PLATE VI. ASHRASI *Tamar*. (Natural size.)

THE PALM.

The trunk is of medium girth; the fronds are long, neither many nor few, the lower ones horizontal; and the frond bases are large and green in colour. The somewhat widely separated leaflets are long, narrow and drooping, and give the palm a graceful appearance. The spines are few, short, and thin.

THE FRUIT.

ASHRASI dates are not particularly long, but they are as wide as AWAIDI or SWAIDAN, so that they appear large and stumpy. The *khalal* are similar in shape and colour to those of BARHI, though they are somewhat larger, but they are easily distinguishable by differences in flavour. Thirty-three *khalal* weighed on the average 0·63 oz. each, and one hundred *tamar* averaged 0·49 oz. (or 14 grms.) each. Vinson in 1911 weighed the *tamar* dates of eleven varieties of various palms growing in Arizona, and found the heaviest averaged 10 grm. The average weight of *tamar* dates of seventeen Shatt Al 'Arab varieties (6,100 weighings) was found to be 0·34 oz. or 10 grm.

The colour of ASHRASI *khalal* is a rich chrome yellow, that of the *ratab* a golden brown, and that of the *tamar* purple black. The last colour is obtained when the dates are left to ripen fully on the palm. The usual practice is to cut the bunches of *ratab* dates and to leave these to ripen on reed mats on the ground, when the colour of the resulting dry *jasab* is buff. The purple *tamar* are toffee-like in consistency and exceedingly delicious. The dry *jasab* also are excellent, and possess that flavour which is described sometimes by Europeans as "nutty." They keep well for at least a year, probably longer, though this period is the longest for which the author has tested them. The *khalal* are astringent and are not eaten, but there is a demand for the *ratab*. The flesh is thicker than that of any other Basra date.

5. 'ATRI

This variety was reported by garden owners to exist on the Shatt Al 'Arab, but the present writer never saw a palm of this name.

6. AWAIDI

GENERAL.

Of all Shatt Al 'Arab dates, only those of SWAIDAN are larger than those of AWAIDI. Not only are they remarkable for their large size, but also for the excellence of their flavour; so much so that, despite the fact that perhaps not more than about a dozen palms of this variety exist, yet its name is known to all date growers. These palms are said to be more numerous in the Hasa. The yield is low, and the palm is said to mature late. Most people who have tasted AWAIDI *tamar* would be disposed to regard them as the best,

or as one of the best, dates produced on the Shatt Al 'Arab. But as the whole crop is insignificant in bulk, they are not to be found on the market. A basket of a few pounds of these dates is considered to be a valuable present from one garden owner to another.

THE PALM.

The stem is of medium girth; the few fronds are long, thin, upright, bunched, and do not bend over at the tips; the mid-ribs are of a yellow shade of green; and the leaf bases are small. The leaflets are widely separated and short; the spines few and long.

THE FRUIT. (NOTE.—The *Tamar*, *Ratab*, and *Khalal* of AWAIDI are illustrated in Plate 27 of Part I.)

The date is of the soft type. In shape it resembles As-HAG, in that it is rather flattened at the base and pointed at the apex, but it is a larger date, the *khalal* being nearly two and a quarter inches long and nearly one and a quarter inches wide at the widest part. The colour of the *khalal* is deep yellow, and the *ratab* become light brown with a purplish tinge, which gives place to purple black in the *tamar* stage. The *khalal* are edible, though they are a little stringy, and the *ratab* also are eaten. They are syrupy without being cloying, and there are some who find them flavourless. All agree, however, in praise of the excellence of the *tamar*, sweet, juicy, and deliciously flavoured. The skin is wrinkled and easily removed from the flesh. The stone is long and thin.

7. BARBAN

GENERAL.

There are several palms of this variety at Amarah; they are not uncommon at Badrah and on the lower Euphrates; and at Baghdad and Hit they are present in large numbers. On the Shatt Al 'Arab they are rare and are known by the synonym of DIGAL JA'MA. Fairchild quotes a garden owner who stated that BARBAN dates ripen in July, and Popenoe copies him in this remark. The present writer has not been able to confirm this statement; and, when he was in Amarah in 1918, BARBAN dates were still partly green by the first week in August, and at Basrah in 1919, these dates were not harvested until the middle of September. There is no export overseas of these dates, and they are eaten in the *tamar* stage. In 1919, Mr. C. Gautby, the Agricultural Officer, Diala, weighed the yields of *tamar* dates of ten palms of this variety at Baqubah, and found that the average of these was 70 lbs. In the same year, on the Shatt Al 'Arab, the writer weighed the yield of *tamar* dates of one palm of this variety and found it to be 93 lbs. The yield generally is regarded as being heavy, and herein lies this variety's only merit.

THE PALM.

The palm is a vigorous grower, and the trunk stout, the fronds long, and the frond bases wide and black. Distinction between it and DAIRI is thus easy, although the colour of the dates is similar. There are many spines.

THE FRUIT.

The dates are medium in size, somewhat long, and slightly pointed at the apex. The *khalal* are bright brick red on an almost obscured field of chrome yellow. These colours darken as the dates become *ratab*, and finally the *tamar* become a reddish black. The *ratab* sometimes appear greenish, and might be mistaken for those of KHADHRAWI. The *khalal* are astringent, and the *ratab* and *tamar* are lacking in flavour though succulent. The *tamar* are said not to keep well. One hundred *tamar* dates weighed 32·0 oz.

8. BARHI

GENERAL.

BARHI dates have been called BARHAB, but the latter name is uncommon. They are famous for the excellence of their *khalal*. This variety has not been reported from the Euphrates, but is well known on the Shatt Al 'Arab, the lower Tigris, and at Badrah. At Baghdad it is not so common. The yield of one palm on the Shatt Al 'Arab was weighed and amounted to 42 lbs. of *tamar* dates. This was considered by its owner to be less than the average yield of this variety. There is no overseas export, and the greater part of the crop is consumed in the *khalal* stage. Some dates are allowed to remain on the palms until the *tamar* stage is reached, but such dates are not to be found in the market; the garden owner usually keeps them for his own consumption during winter. At Basrah (1/10/19) *ratab* were selling at 30 Rs. a *man* of 152 lbs., and seven days later, *tamar* dates at 10 As. a *hagga*, i.e. at the rate of 16 Rs. a *man*. The palm is slow to mature, and the dates ripen late.

THE PALM.

The palm has a stout trunk and many fronds. The midribs of these are the sturdiest of any, and they are long and straight. The lowest or outside fronds are almost horizontal, and they bend down at the tip but very slightly. The many leaflets are noticeably long and upright, so that the palm seems to stand stiffly. The big frond bases are black in colour, and the few spines are short and weak. Offshoots of this palm are difficult to obtain, and may cost a *lirah* (the Turkish gold standard coin worth about £1).

PLATE VII. A Bunch of BARBAN *Ratab* and *Tamar*.
($\frac{1}{5}$ natural size.)

PLATE VIII. A Bunch of BARHI *Khalal*.
($\frac{1}{5}$ natural size.)

THE FRUIT.

The *tamar* dates are of the soft type, large and sub-spherical. A hundred *khalal* weighed 54·0 ozs., and the weight of a hundred *tamar* (average of three weighings of one hundred each) was 42·0 ozs. The colour of the *khalal* is a bright, light yellow, of the *ratab* darker, and of the *tamar* a dull, light ochreous brown. Some consider the *tamar* of BARHI the best flavoured of any dates; certainly they are surpassed by those of few varieties in this respect and by fewer in respect of juiciness. ASHRASI dates in the *khalal* stage are very similar in appearance to those of BARHI, but the astringency of the former forms a ready means of distinguishing between the two. ASHRASI dates are called "hot" and BARHI "cold." There is very little "rag" in BARHI dates, the flesh is thick, and the stone is comparatively small.

9. BINT AL SA'BA

Date palms of this variety were reported to be present on the Shatt Al 'Arab by garden owners, but none were seen by the author.

10. BRAIM

GENERAL.

This date is well known owing to its cooked *khalal* being found in all markets. The palm is common on the Shatt Al 'Arab, nearly 2 per cent. of the adult female palms being of this variety. It is found also all along the Tigris and on the lower Euphrates. The yield of *tamar* dates of one palm was weighed and found to be 42 lbs. The yields of *khalal* dates of sixty palms were weighed and found to average with the stalks 63 lbs. *Tamar* dates are about two-thirds the weight of the same number of *khalal* dates. BRAIM *khalal* are the first dates on the market, and hence fetch a price greater even than their intrinsic merit entitles them. At the beginning of September, 1919, a *man* of 152 lbs. of *khalal* on the stalk cost about 30 Rs. An additional reason why so high a price is paid for these dates is that there are enough palms to create a regular trade in their produce but not enough for the latter to meet all the demand.

It is only seldom that BRAIM dates are allowed to remain on the palm until the *tamar* stage is reached; nearly all the crop is harvested as *khalal*. The bunches are cut one by one, stuck on the more sharp of the two prongs of the *maglas* (a V-shaped piece of apricot wood), and lowered carefully to the ground by means of a rope tied to the other prong. The *jani*, or *fellah*, who cuts the bunches, prevents their too rapid descent by pressing the rope against the palm trunk with his foot. The ripest of the *khalal* clusters and the

PLATE IX. BRAIM *Khalal* being cooked in a copper cauldron (marked with a white +) on the Bank of a Canal. (In the foreground may be seen the rigid, square baskets, A. *Rak*, pl. *Rakuk*, made of palm fronds, which have been used to bring the *Khalal* to the cauldron.)

PLATE X. BRAIM *Khalal Matbukh* spread out to dry.

few *ratab* which are picked from the less ripe bunches are sent to market. The remaining dates are picked off the bunches (the woody stalks of which weigh about 15 per cent. of the whole cluster), and are boiled for one or two hours in large cauldrons (A. *Jiddah*, pl. *Jiddat*), the biggest holding four to five hundred pounds of *khalal*. The fuel used to heat the water is the wood of the bunches, palm fronds, and palm frond bases.

When cooked, the *khalal* are taken out of the hot water by means of a *masfah*, an instrument closely resembling an angler's landing net. The same word is also used for the winnowing fork used in cleaning wheat and barley after threshing. The dates are spread evenly and thinly on specially cleaned and partly shaded ground for ten days to dry. After about five days they are turned so as to ensure even drying. Too much sun would cause them to blacken. The colour desired for cooked *khalal*, or *khalal matbukh* as they are now called, is a rich, deep brown.

In the whole process *khalal* lose half their weight by the loss of most of their water. The cooking kills the protoplasm of the cells, thus allowing the enzyme (invertase), to act upon the sucrose, forming dextrose and lævulose; and also allowing another enzyme or side-chain to form an insoluble compound with the tannin. The dates thus lose their bitterness and are made palatable.

The dried *khalal matbukh* are packed in palm-leaf baskets or in sacks and exported to all parts of the 'Iraq, to Arabia, Persia and to India. In Meerut in 1919 they were sold in the market at one *pie* each, i.e. at the rate of 51 Rs. a *man* of 152 lbs.

THE PALM.

The trunk is of medium girth, the fronds are of medium number, of medium length, of medium rigidity, and the frond bases are of medium size. The colour of the frond bases is green. The leaflets are of medium number, wide, and short; and the spines are few (though more numerous than those of HALAWI), stout, and of medium thickness. The *lif*, or fibre enswathing the crown, is stronger than the ordinary, and hence is preferred for rope making.

THE FRUIT.

The date bunches do not hang downwards as much as those of most other varieties. The *tamar* date is of medium size and tends to be rectangular in shape, though the *khalal* is broadly ellipsoid. The *khalal matbukh* are shrivelled and markedly wrinkled. Six hundred *khalal* picked at random averaged 0·54 oz. each in weight, two hundred *ratab* 0·47 oz., three hundred *tamar* 0·33 oz., and three hundred *khalal matbookh* 0·26 oz. The colour of the *khalal* is a delicate lemon yellow exquisitely flushed with bright rose. Examined

under a lens the red is seen to be concentrated into a great number of minute spots scattered over the skin. This rose blush is more conspicuous on one side of the date than upon the other. The *ratab* loses the rose and becomes dull golden brown, and the *tamar* are almost black with a purple bloom. If well made the *khalal matbukh* are the colour of old gold; otherwise they may be dirty brown or darker. In all stages, BRAIM dates are delicious; the *khalal* are fresh and juicy and hardly astringent; the *ratab* melt in the mouth; the *tamar* are like caramel in consistency and rich in flavour, and the *khalal matbukh* are crisp, sweet, and "nutty." The last keep their quality for a long time.

11. BUBAK

GENERAL.

This palm variety was found only at Fao, and there it is not common, but it is reported to be more common in the Hasa. There is no export of *tamar*, which are consumed locally.

THE PALM.

The palms are similar in general appearance to ISTA'AMRAN palms, but the trunks, though thin, are slightly stouter. The fronds are short, a little longer than those of ISTA'AMRAN, and tend to project from the top of the stem at all angles, giving a somewhat mop-like aspect to the palms. The rather short leaflets are stiffly upright, and the spines are somewhat widely separated. The date is harvested at the same time as most of the other varieties.

THE FRUIT.

This is a medium-sized date, rather rectangular in shape. The *tamar* are intermediate between the soft and the dry types, that is to say, they are of the consistency of French prunes as sold in English shops. The *khalal* and the *ratab* are too astringent to be eaten. JOZI *khalal* are similar in colour, shape and size to those of BUBAK, but are distinguishable from the latter by their sweetness and lack of astringency. The *khalal* are red, and the *tamar* a brownish black. In colour and flavour they resemble the IBRAHIMI of northern Lower 'Iraq. Owing to this excellence of flavour, they are not packed with the dates of ISTA'AMRAN or of other varieties, but separately in *halan* or palm leaf baskets.

12. CHIBCHAB

GENERAL.

At Fao this date is called BUGHBUGH. The palm is to be found infrequently on the Shatt Al 'Arab, the lower Tigris, and the lower Euphrates. The dates ripen late, but the greater part of the crop is cut as *khalal* and cooked to make *khalal matbukh*, as in the case of BRAIM; but, although the

PLATE XI. A BUBAK Palm in Grove of ISTA'AMRAN.

PLATE XII. ISTA'AMRAN Palm on left, CHIBCHAB on right.

date is strikingly large, yet it is not such a favourite as the latter owing to its inferior flavour. *Khalal matbukh* were being sold at Amarah (28/12/19) at 30 Rs. a cwt. There is some export of the cooked *khalal*, but they are seldom seen in European markets. At Marseille (23/8/20) were seen what appeared to be CHIBCHAB *khalal matbukh*, which were being sold at five francs eighty centimes the kilogramme, i.e. at the rate of exchange then prevailing, about three annas a pound. The yield of *tamar* dates of one dry old palm was weighed and found to be 25 lbs.

THE PALM.

The trunk is of medium girth; the fronds are few, long, heavy and stiff, and bear a medium number of long, stiff leaflets. Spines are many and long, and fibre is abundant.

THE FRUIT.

CHIBCHAB *khalal* are long and large. They are as long as those of AWAIDI, though not so wide. The *tamar* shrink considerably, but, even so, are among the biggest of dates. One hundred *tamar* which were weighed averaged 0·40 oz. each, and a hundred *khalal matbukh* 0·44 oz. The *khalal* are yellow, the *ratab* darker, and the *tamar* reddish brown with a little yellow skin round the base, dry, very wrinkled, and rather like unusually long KHADHRAWI, though in flavour they are much inferior, being more fibrous and less sweet. The *khalal* are sweet but exceedingly fibrous, not unlike sugar-cane to eat. This date is most pleasant when eaten in the form of cooked *khalal*, in which form the dates are greenish gold in colour, hard and deeply wrinkled.

13. DAILI

One palm of this variety was seen by the writer on the Shatt Al 'Arab, but no notes were taken concerning it.

14. DAIRI

GENERAL.

DAIRI palms, also called MAISHI and TAIB AL 'ISM, constitute about four per cent. of the palm population of the Shatt Al 'Arab. They are to be found all along the Tigris and the lower Euphrates. The dates are eaten only in the *tamar* stage, and are to be found dry in 'Iraqi markets at all seasons, like BADRAIAN, ASHRASI and ZAHIDI. There is no overseas export, though some go to Arabia. Date merchants always mention DAIRI dates as those which first are attacked by weevils when stored in shops and warehouses. The hard character of the fruit makes it especially suitable to be taken on a

PLATE XIII. A Bunch of *Khalal*, *Ratab* and *Tamar* on a Twelve-year old DAIRI Palm. ($\frac{1}{8}$ natural size.)

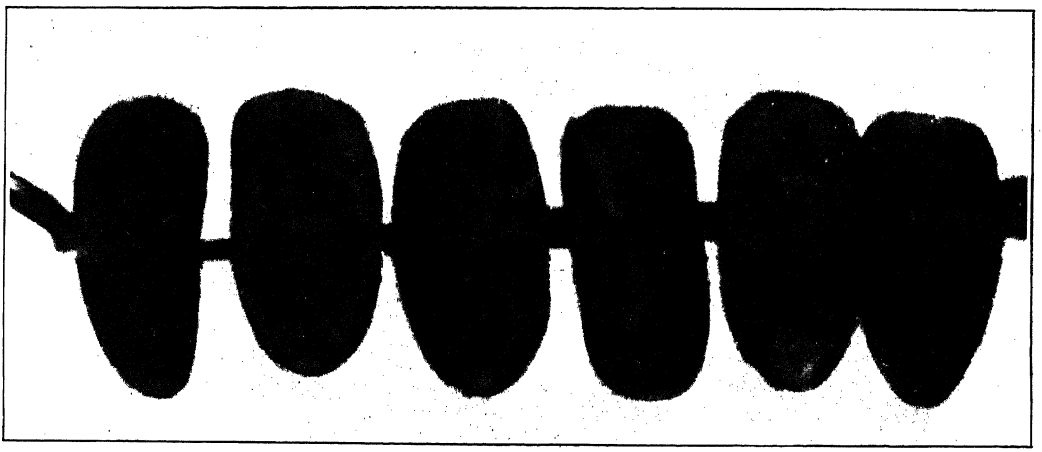

PLATE XIV. DAIRI *Tamar*. ($\frac{15}{16}$ natural size.)

journey in the pocket, handkerchief, or saddle-bag. Date syrup, or *dibis*, made from DAIRI is not known, dates of this variety being too dry to yield it. The average weight of *tamar* dates yielded by thirty-six palms in Shatt Al 'Arab date gardens in 1919 was 32 lbs. The palms appear to be able to resist the ill effects of drought better than those of other varieties, with the possible exception of ISTA'AMRAN. At Nasiriyah (25/8/18) DAIRI *tamar* were being sold in the market at 15 Rs. a *man* of 152 lbs., and in the gardens for 12 Rs. At Amarah (28/12/19) dry DAIRI could be bought in the market at 20 Rs. per Amarah *man* of 112 lbs., and the pressed dates in baskets at half that sum.

THE PALM.

DAIRI palms are the most graceful of all; the trunks are slender, the fronds long and thin, and the scanty, long, and narrow leaflets hang delicately down. The bases of the fronds are small and green. The spines are medium in number and fewer than those of ISTA'AMRAN palms. The fruiting stalks are orange in colour, long, strap-like, and weak.

THE FRUIT.

The proximal part of the date bunch is rather bare of fruit. This dry date is rather long, wider at the base than at the apex, and is similar in shape and size to the more famous HALAWI. The wrinkling of the skin is more marked at the apex than at the base. One lot of one hundred *khalal* weighed 48·0 ozs., and five lots of one hundred *tamar* averaged 35·0 ozs. The colour of the *khalal* is a deep chrome yellow, which changes to dull rose. The *ratab* are more brown, and the *tamar* become a dull, violet red or a brown purple. A heap of DAIRI *tamar* seen from a little distance has somewhat the colour of a bank of partly flowering heather. The *khalal* are astringent, though they are eaten occasionally, and the *ratab* also are not of good flavour; but the *tamar* are dry dates, not very sweet, and of pleasant taste. The skin is tough, and the stone large.

15. DIGAL

As mentioned above (Date Varieties and their Classification), a DIGLA is the name given to any seedling palm, and hence it may possess any combination of characters according to the genetic constitution of its parents. Although large numbers of seeds germinate in date gardens, most seedlings are uprooted, because it is not profitable to tend for ten or more years a palm which may produce fruit of an inferior kind, when its place might have been filled by an offshoot of a known and valuable parent. Also, offshoots bear sooner than seedlings. However, a certain number of seedlings do survive, and in Shatt Al 'Arab date gardens about two per cent. of the

adult females are seedlings. A point in their favour is that they cost the garden owner nothing, whereas offshoots sometimes cost much money.

The fruit of DIGAL palms is not only generally of inferior quality, but is so diverse in character that its marketable value is less than that of any date variety. Some DIGAL palms, however, produce excellent fruit, and these, on being propagated, generate a new variety. Plate XV. shows the fruit of a

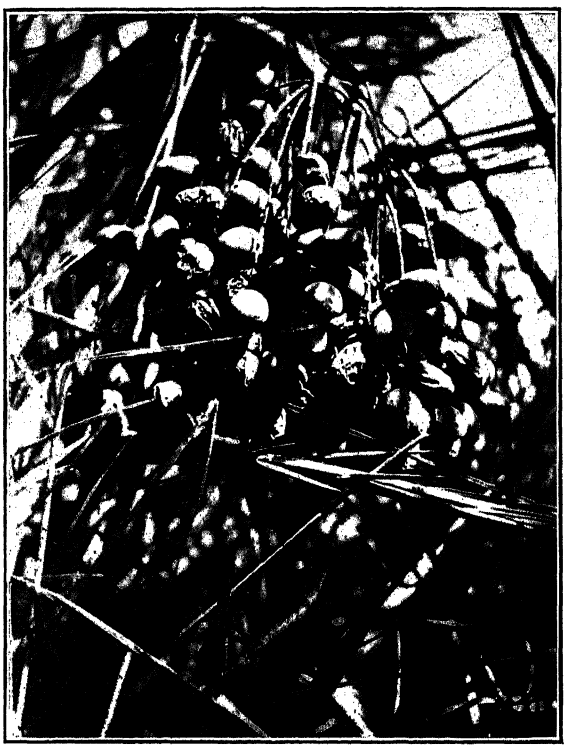

PLATE XV. A Bunch of *Khalal*, *Ratab* and *Tamar* of an excellent new Seedling Palm. ($\frac{1}{5}$ natural size.)

new eight-year-old seedling seen at Da'aiji (7/9/19). This palm at present has no name but DIGLA, but it is to be presumed that if the owner propagated it an excellent new variety will be produced, for the fruit was of very high quality.

GHAIBĀNI means an inferior kind of date palm, and is often used as a synonym for DIGAL. DIGAL fruit in most gardens is packed in baskets with the inferior ISTA'AMRĀN.

PLATE XVI. A Seedling Palm, GANTAR-like in appearance, producing KHADHRAWI-like fruit.

PLATE XVII. A Seedling Palm producing GANTAR-like fruit.

THE FRUIT.

The *tamar* are of the soft type, and medium size. In shape they are twice as long as broad; and the broadest place, as in the case of ZAHIDI dates, is not in the middle or at the base, but about two-thirds of the distance from the base to the apex. The *khalal* are yellow, with, occasionally, a very slight

PLATE XIX. An Old DIGAL MUSA Palm Bearing *Tamar*.

amount of pink spotting; the *ratab* are deep yellow and wrinkled, and the *tamar* are a light golden brown in colour. The *khalal* are somewhat sweet and only slightly astringent; the *ratab* are edible; and the *tamar* are caramel-like, but not markedly sweet. This is a date of no marked delicacy of flavour.

19. DUWAICH

DUWAICH palms are to be found in the 'Iraq only on the Shatt Al 'Arab, and here only in very small numbers. They are reported to be numerous in the Hasa.

20. FARSI

GENERAL.

FARSI palms are very rare in Shatt Al 'Arab date gardens, and their fruit is of no particular excellence. The name would seem to indicate a Persian origin, but there is not a great deal to be learnt about a palm merely from its

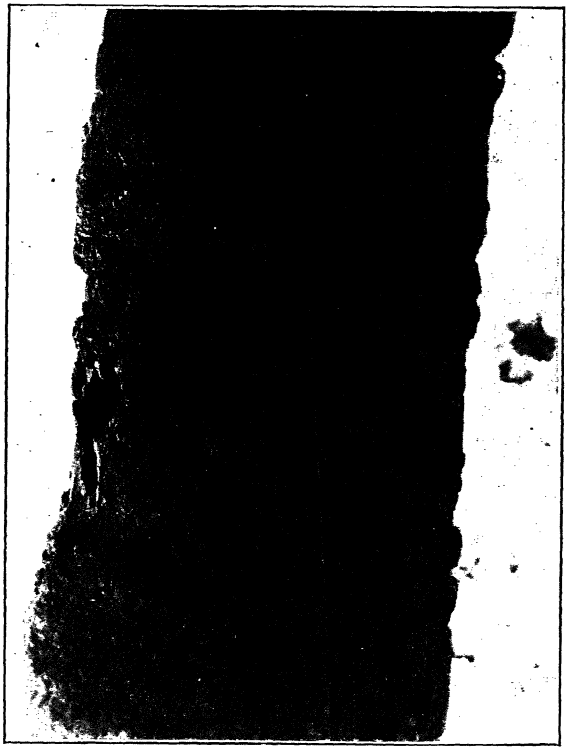

PLATE XX.
Trunk of old GANTAR Palm. (1/4 natural size.)

PLATE XXI.
An Eight Year Old GANTAR Palm Bearing Dates.

name, and many are the ludicrous etymological mistakes which have been made by those who have written about date varieties. FARSI dates are consumed locally.

THE PALM.

The palm is bold and graceful. The trunk is stout; the fronds are of medium length, upright, and slightly drooping at the tips; and the bases of the fronds are small, yellow and black. The leaflets are wide, thickly clustered together, and drooping; and the spines are as numerous and as stout as those of ZAHIDI, but shorter.

THE FRUIT.

The dates are of medium size, slightly smaller than those of DAIRI, which they resemble in shape and colour. That is to say, they are somewhat long and pointed, and are a rich, dull red in the *khalal* stage, and become darker and browner as *ratab*, and, finally, a dull purple as *tamar*. One hundred tamar weighed 30·0 ozs.

21. GANTAR

GENERAL.

Nearly two per cent. of the adult female palm population of the Shatt Al 'Arab belong to this variety. It is also not uncommon in the date gardens of the Tigris and the Lower Euphrates. Old palms can be detected readily by the remarkable smoothness of their trunks, especially of the upper halves.

GANTAR palms probably are no more irregular than those of other varieties in their maturing, but two palms of this variety which came under the observation of the writer provided an instance of much individual variation. Two offshoots of approximately the same size were planted close together in a dry and untilled garden in 1911. In 1919, one was a vigorous young palm producing a fairly heavy crop of dates as well as offshoots, while the other was still hardly more than an offshoot and had produced no dates.

The yield of *tamar* dates of thirty-seven GANTAR palms was weighed in 1919 on the Shatt Al 'Arab and found to average 17 lbs. The harvest is late. Some years ago, the *khalal* of GANTAR were cooked and sold as *khalal matbukh*, in the same way that BRAIM and CHIBCHAB dates are still sold; but latterly, the excellence of the GANTAR dates as *tamar* seems to have become widely known, and the bulk of the crop, if not eaten fresh as *ratab*, is packed as *tamar* in baskets and sold in the local markets at a price substantially higher than that realised for ISTA'AMRAN. At Nasiriyah, (25/8/18), GANTAR *tamar* were sold at 18 Rs. a *man* of 152 lbs.

PLATE XXII. An Eight Year GANTAR, still in the offshoot stage.

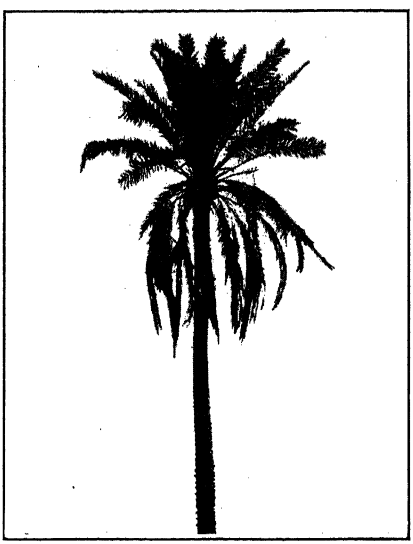

PLATE XXIII. An Old GANTAR.

THE PALM.

The trunks of the palms are thin and conspicuously smooth in old age. The fronds are numerous and rather long and spread out widely. The frond bases are green, marked with black. The numerous leaflets are short and wide; and there are many large spines, as many as, or perhaps even more, than on ZAHIDI palms.

THE FRUIT.

GANṬAR dates are small and sub-spherical in the *khalal* stage. The *tamar* are irregular in shape and much wrinkled. They are widest in the centre, and the apex is rounded. The average of four different weighings of one hundred *tamar* dates was 27·0 ozs. The *khalal* are a deep golden yellow: the *ratab* are darker; and the *tamar* are a dark brown. The flavour of the last-named is excellent and suggests toffee. The *ratab* are sweet and full flavoured, but the *khalal* are too astringent to be eaten with pleasure. The date flesh is like caramel in consistency. The stone is large, relative to the size of the date

22. HABSI

GENERAL.

This is a very rare variety of the Shatt Al 'Arab, and is not found elsewhere in the 'Iraq. There is no export of these excellent dates. They are packed separately in the *tamar* stage and eaten by the garden owners. The yield of *tamar* dates of one old palm was weighed in 1919 and amounted to 25 lbs.

THE PALM.

The general appearance of the palm suggests ISTA'AMRAN: the fronds are short and do not droop at the tips, and the leaflets are drooping, wide and few.

THE FRUIT.

The date is of the soft type. It is large, long, and as wide as DAIRI but rather longer. One hundred *tamar* weighed 35.0 ozs. The *khalal* are a bright, brick red colour, (like those of KHASAB), which darkens in the *ratab*. The *tamar*, when not grown in too dry a situation, are a deep purple with a greyish bloom in the crevices of the wrinkled skin. The *khalal* and *ratab* are not well-flavored, but the *tamar* are excellent and are not too sweet.

PLATE XXIV. An Eighteen Year Old GANTAR.

PLATE XXV. An Old HABSI Palm.

23. HADAL

GENERAL.

This is a rare and unimportant Shatt Al 'Arab variety of no particular excellence. There is no export of its dates.

THE PALM.*

Palms of this variety are distinguished by possessing fronds which bend over at the tips more than those of any other variety. One is perhaps justified in concluding that it is this character which provided this variety with its name. The fronds are very long, and the centre ones appear to bunch themselves together. The leaflets are long, and so are the stalks of the fruit bunches.

THE FRUIT.

The fruit is small and sub-spherical. The *khalal* are a rich chrome yellow, darker than that of BRAIM *khalal*, but possessing a somewhat similar pinkish clouding. The *ratab* are of a light golden brown colour, and the *tamar* are brown purple with a blueish bloom, and are not dissimilar to ISTA'AMRAN *tamar*. The fruit in all three stages is sweet and juicy, but of indifferent flavour.

24. HALAWI

GENERAL.

If it be assumed that the figures for relative frequencies of the different varieties of date palms given in Part II. of this memoir be correct, then twenty-nine per cent. of the adult female palms, or thirty-two per cent. of the whole palm population of the Shatt Al 'Arab date region, consists of this variety. It must be remembered, however, that though the main facts deduced therein are reasonably accurate, yet too much reliance must not be placed on the correctness of the actual percentages. It is certain, however, that, next to ISTA'AMRAN, HALAWI is the commonest variety of the region. HALAWI palms, though not common, are found also along the whole length of the date-producing part of the River Tigris, and Fairchild's shipchandler reports a variety of the same name from Southern Persia. A date called MAQSAB grows in Hadramaut, and appears to be the same as HALAWI in the habit of the palm and in the form of the *khalal* and *ratab* dates, but *tamar* were not seen by the writer. The offshoots from which the palms were produced were stated to have been imported from Basra.

It is not easy to estimate the total 'Iraqi Shatt Al 'Arab crop of this date variety, but a very rough approximation might be from 60,000 tons to 70,000 tons (reckoning 29 bearing HALAWI per acre, the yield per palm at

* A HADAL Palm is illustrated in Plate 33 of Part I. of this Memoir.

44 lbs., and the area of date gardens on the 'Iraqi part of the Shatt Al 'Arab at 174 sq. miles). The value of the annual crop might be about 100 lakhs of rupees. Nearly all the crop is exported, and, since, in 1919, dates to the value of 219 lakhs of rupees were exported from Basrah, HALAWI probably formed more than one-third by value of the whole Basrah export of dates. In 1917, according to the Director of Local Resources at Basrah, about one-third by weight of the whole Basrah export of dates (i.e. 25,000 tons) was HALAWI; but 1917 was an exceptional year in that shipping was scarce, so that too much reliance should not be placed on these figures in estimating exports in normal years.

The price of HALAWI dates, as of all dates, fluctuates rapidly, and within wide limits. Best HALAWI were changing hands at Basrah (17/10/19) at 600 Rs. a *karah* of 6,048 lbs., but the average price throughout the season was probably nearer half this sum. The 1921 season opened at 570 Rs. a *karah*, and the highest price reached was 620 Rs. Such a high price as this means that the profits of the larger exporting firms are reduced considerably, and, in some cases, it is probable that exporters have suffered a dead loss.

It will have been observed from the figures of the export trade that, commercially, HALAWI dates are important. They supply the whole of the American demand, and form a large part of the consignments to the British Isles. The light brown colour of these dates is said to be required by the consumers in the United States, but in the United Kingdom it would seem that there is not the same preference for this particular colour.

HALAWI palms are most densely planted in the Abul Khasib district to the south-east of Basrah, on the right bank of the river, but they are to be found to some extent in most parts of the Shatt Al 'Arab. Like most palms, HALAWI seem to be very tolerant of widely differing soil conditions. The better dates are produced where the water supply is ample, and hence those HALAWI dates produced on the desert edge of the date belt fetch lower prices than those from the river's edge.

HALAWI palms are considered to be more responsive than others to an application of manure, and, in the best-tilled gardens, each palm receives a few basketfuls of village refuse every fourth year, and, in some cases, even more often.

During the course of the inquiry into the yield of date palms on the Shatt Al 'Arab in 1919, the yields of *tamar* dates of one hundred and fifty palms were weighed and found to average 44 lbs. The highest single yield was 140 lbs. The palms begin to bear as early as those of any variety, with the exception of those of ZAHIDI which are precocious. That is to say, under favourable conditions, the palms probably will bear a few dates about five years after planting out, and in five years more should be bearing heavily.

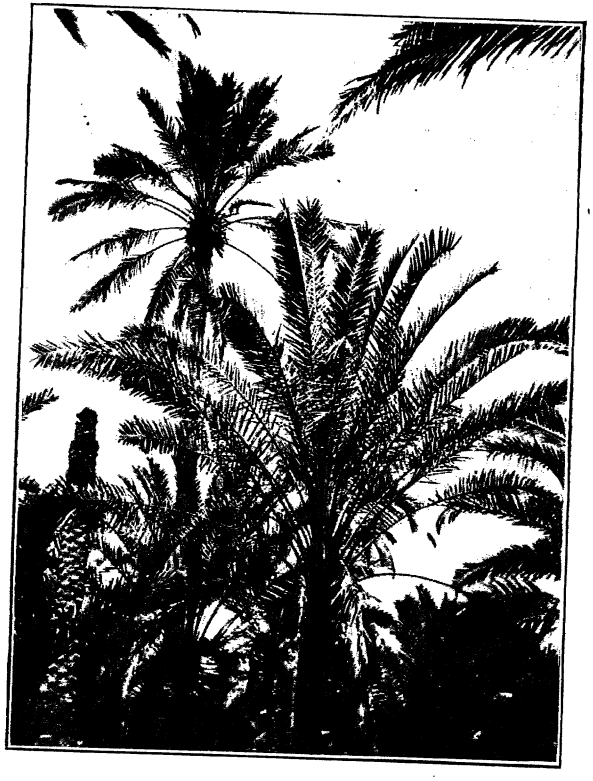

PLATE XXVI. An Old HALAWI Palm in the background and a young one in the foreground.

PLATE XXVII. A Thirty Year Old HALAWI Palm.

HALAWI dates also ripen as early as any of the commoner sorts. BRAIM, of course, are found in the market long before HALAWI, but only in the *khalal* stage; HALAWI *khalal* are not edible.

It is stated by garden owners that the HALAWI is a comparatively new variety on the Shatt Al 'Arab, the rapid spread of which has been stimulated by the great and increasing American demand. This variety, certainly,

PLATE XXVIII. HALAWI Dates (¼ natural size).

is the most popular variety with which to plant a new garden, because the palms grow quickly, the offshoots are not difficult to obtain, the yield is not low, there is no especial susceptibility to disease, the price of the dates is high, and the demand for them constant.

THE PALM.*

HALAWI palms may be distinguished from those of other varieties by their bright green, almost glaucous, foliage, and by the long, upright, and not ungraceful fronds. These fronds are as long as those of any variety, and certainly longer than those of any of the more common ones. The frond mid-ribs are stout and the bases of the fronds are larger than those of all other varieties, very prominent, and in colour green, sometimes relieved with a

* See also Plate XLVII.

little black. The leaflets are numerous, long, wide, and upright; and there are fewer spines than are to be found on the fronds of any other variety. For this reason, amongst others, is the palm beloved of its cultivators. Offshoots cost from 2 Rs. to 5 Rs. each.

THE FRUIT.

The *tamar* are of the drier kind of the soft type, of medium size, long, and broader at the base than at the apex. The average of two weighings of different lots of one hundred *khalal* amounted to 49·0 ozs., and the average of eight weighings of different lots of one hundred *tamar* dates amounted to 32·0 ozs. The *khalal* are pale yellow, the *ratab* dull gold, and the *tamar* a yellowish brown or deep, dull gold colour. This colour is easy to distinguish from the almost black blue of the ISTA'AMRAN, the almost black red of the DAIRI, or from the deep, dull, blueish brown of the KHADHRAWI, and resembles most the ochreous brown of the ZAHIDI. Under exceptionally favourable conditions, however, the *tamar* may assume a blueish, ISTA'AMRAN tinge; and this is considered to indicate a flavour superior to the ordinary. The *tamar* when stacked become more red, so that by the time they are packed they are usually a light red brown. The *khalal* and *ratab* are hard, astringent, and not very sweet; but the *tamar* are of good flavour. Although there is so great a demand abroad for this date, those who live where it grows usually prefer other varieties, either one of the more rare kinds, or, of the commoner KHADHRAWI. There is little "rag," but the skin is thick and strong, and often can be peeled off the flesh, for the *tamar* date is much wrinkled. Owing to their dry nature, HALAWI dates are seldom pressed for date syrup; but, when obtained, this product is of better flavour than that obtained from ISTA'AMRAN, and is sold for half as much again.

25. HALAIAH

One palm of this variety was seen at Da'aiji on the Shatt Al 'Arab. The trunk was of medium girth, and stouter than those of ISTA'AMRAN palms. The yield of *tamar* dates of this one palm was 65 lbs. This variety is said to be found on the Lower Euphrates, and a synonym for it is said to be HALWI.

26. HAMRAWI

GENERAL.

Palms of this variety (called also HAIMAR or HAMRAIAH) are common, and produce excellent dates at Badrah and Jisan. At Kut, they do not grow so luxuriantly, while the few palms which are to be found on the Shatt Al 'Arab do not seem as though conditions there are favourable to them. At

PLATE XXIX. Trunk of Old HAMRĀWI Palm showing holes made by palm-boring insects.

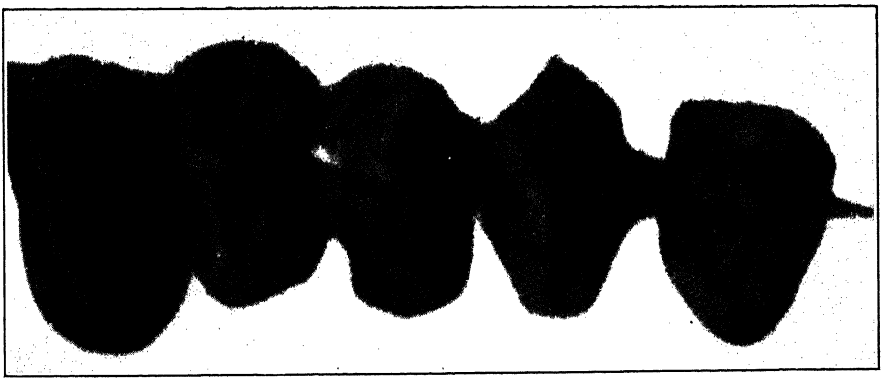

PLATE XXX. HAMRĀWI *Tamar* (natural size).

Baghdad and at Hit, however, the dates of this variety are of better quality. The small Shatt Al 'Arab crop of *tamar* is consumed locally, but from Badrah and Jisan there is a considerable export of them by mule and donkey to the Tigris.

THE PALM.

The palms greatly resemble those of the variety KHADHRAWI, when grown under dry and otherwise unfavourable conditions; but when well-cultivated, their appearance is quite otherwise; the trunks are then of greater girth; the fronds many, long, and stout, the outer ones inclining to the horizontal, the tips undrooping; the frond bases of medium size and black and green in colour; the leaflets many, of medium length and width; and the spines are few, short, and thin.

THE FRUIT.

HAMRAWI dates are of medium size. When in the *khalal* stage they are not unlike small DAIRI in shape, though, as they mature, they contract somewhat in length and come more to resemble large KHADHRAWI dates. The skin of the *khalal* is of an attractive light brick-red colour, with minute areas of darker red scattered upon it. The *ratab* darken, and the *tamar* are a dull yellow brown or a dull red brown. The *khalal* are sweet, and the *ratab* also are edible; but most of the fruit is eaten in the *tamar* stage, in which it is of a somewhat toffee-like consistency and pleasantly flavoured.

27. HASAWI.

GENERAL.

Palms of this variety are very rare on the Shatt Al 'Arab, though they are reported as being much more numerous in the Hasa further south. The dates are too uncommon for there to be any separate export.

THE PALM.

The trunk of the palm is slender; the fronds are few, long, and graceful; and the frond bases are green.

THE FRUIT.

The dates are of medium size, oblong, and not markedly pointed in shape. The *khalal* are a bright yellow, the *ratab* very light golden brown, and the *tamar* a dull purple with a bluish bloom not unlike that of ISTA'AMRAN. All three stages are pleasantly sweet, but are not possessed of any outstanding merit in respect of flavour. The *tamar* are sticky.

PLATE XXXI.
A Fifteen Year Old HASAWI Palm in Bearing.

PLATE XXXII.
HASAWI *Khalal* ($\frac{1}{10}$ natural size).

28. HAWAIZ.

This variety is represented by only a very few palms on the Shatt Al 'Arab, but is reported as being much more numerous further south. Fairchild speaks as follows of HEVEZI, which he calls a Basrah variety: "A date resembling the standard market sorts like HALAWI, but a much more delicious flavour. Samples sent to New York were pronounced by date buyers the finest dates they had ever tasted. Colour light, size medium, ripening in September in Basrah. A little-known sort from Abu Kassib, the Basrah date centre."

29. ISTA'AMRAN.

GENERAL.

ISTA'AMRAN palms are also known as STA'AMRAN, SA'AMRAN, SAMBRAN, 'AMRAN (not to be confused with the northern Euphrates palm of this name), SAIAR, or SAI. Not only do they form about 45 per cent. of the total palm population of the date gardens on the 'Iraq shores of the Shatt Al 'Arab, but they are to be found at all date centres on the river Tigris and Euphrates, though they are not common in the north. This palm appears to have been introduced into Hadramaut under the name of BASRAWI or ZABIDI. It is also one of the introductions into the United States of America, so that its present habitat is extended. It is probable that it is the commonest date variety of the world. The bulk of the unsightly masses of dates in English greengrocers' shops are of this variety, and a large part of the baskets exported to India and Arabia are filled with ISTA'AMRAN. It is the chief date used in the production of date syrup.

This palm appears to withstand adverse conditions more easily than any other, and is to be found in the low lands of Fao, where inundations of salt water are not infrequent, and also everywhere along the desert edge under conditions too dry for choicer sorts. Under arid conditions, some varieties, notably KHADHRAWI, suffer severely from the *toz* disease, but ISTA'AMRAN palms suffer comparatively little. However, it must not be supposed that good fruit is produced under adverse conditions. So far from that being the case, the fruit of this variety is, perhaps, more variable in quality than that of any other; at Fao, it is often unpleasantly salty, and along the desert edge so dry and so thick-skinned as to be hardly edible. When conditions are exceptionally favourable, however, the palm and its fruit luxuriate. In January, 1917, in order to estimate the water requirements of date palms, a garden of ISTA'AMRAN palms, eight acres in extent, was surveyed accurately, and the area of water channels measured. It was found that the area of the garden was 39,750 sq. yards, the area of the irrigation channels was 3,500 sq.

yards, and the number of palms was 1270. Thus, in the case of this garden in which conditions appeared favourable to the proper growth and bearing of the palms, there were 167 palms to the acre, and each palm was provided with an area of 30 sq. yards of land and 3 sq. yards of water channel. The water channels filled up twice daily owing to the action of the tides.

PLATE XXXIII.
A Twenty-five Year Old ISTA'AMRAN Palm, unusually luxuriant owing to exceptionally favourable conditions.

The yield of ISTA'AMRAN palms is low. The average of 379 palms, the yields of which were weighed in 1919, amounted to but 37 lbs. The majority of these palms, however, were growing in dry gardens. The highest individual yield was 120 lbs.

Figures of the export of dates by varieties are not available, but it is possible that at least one-third by weight of the dates exported from Basrah are of the ISTA'AMRAN variety. The only year for which figures are available (1917) showed 36,000 tons of ISTA'AMRAN exported from Basrah out of a total of 80,000 tons.

PLATE XXXIV. ISTA'AMRAN Palms at the edge of the Desert.

PLATE XXXV. ISTA'AMRAN Palms in a well-irrigated Garden.

In Nasiriyah (25/8/18) ISTA'AMRAN dates were to be obtained in the gardens at 9 Rs. a *man* of 152 lbs., i.e. at the rate of 360 Rs. a *karah* of 40 *man*, and in the market the same kind of dates were realising 13 Rs. a *man*, i.e. 520 Rs. a *karah*. In September, 1919, at Basrah, these dates were being sold at 450 Rs. a *karah*, and on 17/10/19, at 440 Rs., at the same time that good ZAHIDI were fetching 400 Rs. to 420 Rs. In Amarah (28/12/19) the retail price in the market was 10 Rs. a cwt.

THE PALM.

The palm is slender and small and the "bark" comparatively smooth, owing to the palm-leaf bases being small and weathering down easily. The many fronds are short, thin, rigid, and borne stiffly, so that the ISTA'AMRAN palm has a mop-like, characteristic appearance readily recognised. This "shock-headed" aspect is heightened by the form of the pinnae, which are of medium number, short, widely separated, and inserted at widely differing angles to the midrib. Much watering causes the leaflets to droop. The leaf-bases are black or dark brown in colour. ISTA'AMRAN palm fronds are sold at about 9 or 10 Rs. a thousand, 2 or 3 Rs. cheaper than those of other varieties because of their small size. The many spines are short and stout. The fruiting stalks are conspicuously bright yellow when the fruit is ripe.

THE FRUIT.

The fruit is of the soft type. The usual practice is for the *tamar* dates to be put in the *madibsa* or press (see Plate 48, Part I.) before packing, so that the *dibis* or syrup may be extracted, but this operation may be omitted if the dates have been grown in a dry garden.

The date is just under the average size of dates, and is rather pointed at the apex. One side often appears concave. Weighings were made of 16 separate lots of one hundred ISTA'AMRAN *tamar*, and the average of these was 26·0 ozs. The *khalal* are a bright yellow in colour, though there is one recognised variety of this date which has the yellow of the *khalal* flushed with pink. The *ratab* generally are characterised by a definite line of demarcation between the black and soft apical portion of the date and the yellow and hard basal portion. This characteristic is striking at a certain stage in the ripening of the dates when they are seen in bulk on the palms. The *tamar* are dull purple with a purple bloom, the better qualities inclining to black or blue and the inferior to red. The skin is of medium thickness, and there is some "rag." The *khalal* and *ratab* are not eaten, and the flavour of the *tamar* is inferior, and some people are able to detect a slight saltiness. Arabs class ISTA'AMRAN among the "hot" dates.

PLATE XXXVI.
Two Twenty-five Year Old JUZI Palms.

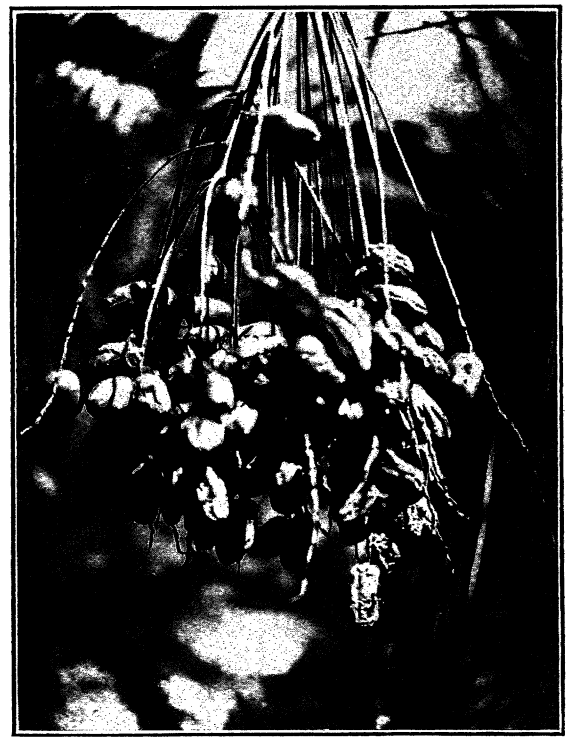

PLATE XXXVII.
A Bunch of JUZI *Tamar* ($\frac{1}{5}$ natural size).

30. JUZI.

GENERAL.

This palm variety, also called JUWAIZI and RALAIZ, is to be found along the Tigris and the Euphrates, but is very rare on the Shatt Al 'Arab. It is reported as being a common variety in Hasa, where it is said to be known as RAZAIZ or ARZAIZI.

THE PALM.

The palms are similar to those of the variety BARBAN, but the trunks, though stout, are thinner. The fronds are many, of medium length, thin, standing stiffly upright, not bending over at the tips. The bases of the fronds are small and yellowish green. The leaflets are many and short, and the many spines long and thin.

THE FRUIT.

The *khalal* are rounded, and wide in proportion to their length, and of a bright, light red colour. The *ratab* are darker, and the *tamar* are dull brown and wrinkled. All the forms are edible.

31. KHADHRAWI.

GENERAL.

On the Upper Euphrates the distinct variety MURRI is sometimes called by this name. About eight per cent. of all the date palms of the 'Iraqi part of the Shatt Al 'Arab appear to be of this variety; it is common at Suq Al Shuyukh and Amarah, and it is also to be found as far north as Baghdad on the Tigris and Hit on the Euphrates. Popenoe reports it from Mandali and Baqubah.

Popenoe remarks that it frequently bears the second year after planting out and usually the third year. The present writer is unable to confirm this observation. Indeed, he would have said rather that KHADHRAWI palms come into bearing later than most. The yield of this variety is low; the average yield of 116 palms was found to be only 30 lbs. during the course of the yield inquiry on the Shatt Al 'Arab in 1919.

KHADHRAWI palms and their fruit are more subject to disease than those of other varieties, especially to the *Toz* disease; and the palms need to be carefully cultivated and well watered if good quality dates are to be produced.

In Nasiriyah (25/8/18) 10 Rs. was asked for a *man* of 152 lbs. of *tamar*, i.e. at the rate of 400 Rs. a *karah* of 40 *man*, and half as much again was asked in the market. In Baghdad, January, 1920, these dates were being sold at

25 Rs. a *waznah* of 224 lbs. In Muzayib (25/4/20) the retail price of KHADHRAWI was 17 Rs. a *waznah*, i.e. at the rate of 459 Rs. a *karah*. The present (Christmas 1921) retail price in England is six pence a pound carton, i.e. at the rate of 2,268 Rs. a *karah*. KHADHRAWI dates are the best flavoured of the four commonest export varieties, and are the only dates packed in the one-pound cartons; and one of the two varieties packed in the ten-pound cartons. In flavour, many opine they surpass the DAGLAT NUR of North Africa; yet they are never packed in the singularly attractive manner in which DAGLAT NUR are packed. The Manager of the Mercantile Department of Messrs. Gray, Dawes and Co., Ltd., was inclined to ascribe the fact to the thickness of the skin of the Mesopotamian date, which, in his opinion, made it less suitable for fancy packing than that from North Africa. In 1917, 15,000 tons of KHADHRAWI dates were exported from Basrah. Inferior dates of this variety are often packed with ISTA'AMRAN.

THE PALM.*

The trunks are thin, but not so thin as those of ISTA'AMRAN. This variety has fewer fronds than any other variety, and, as these are also medium to short in length, the palms have a somewhat bare appearance. The tips of the fronds do not bend downwards, and their bases are green in colour. The short leaflets are very closely set on the fronds, and give to the palms a characteristic feathery appearance, whereby they may be recognised easily. Popenoe states that the spines are conspicuously long and may reach six inches in length, but this does not seem to be characteristic of the palms of this variety met with by the present writer.

THE FRUIT.

The dates are of the soft type, though they are generally more dry than HALAWI or ISTA'AMRAN. They are below the normal length, but above normal width and rather square in outline. The average weight of seven different lots of one hundred *tamar* dates was 26·0 ozs., which is rather below the average weight of Shatt Al 'Arab dates as a whole. The *khalal* are yellow, and the best *ratab* are a distinct, translucent sea-green in colour. It is possible that it is in allusion to this delicate colouring that this date has been named. The *tamar* are a dull red brown, with a bluish bloom when freshly heaped. The flavour of the dates in the two last stages is excellent, but the *khalal* are not edible. The Arabs consider the date "cold." The skin has a tendency to stand away from the flesh in "blisters."

* A KHADHRAWI Palm is shown in Plate 31 of Part I. of this mémoir.

PLATE XXXVIII.
KHADHRAWI *Ratab* and *Tamar* ($\frac{1}{5}$ natural size).

PLATE XXXIX. A KHASAB Palm.

PLATE XL. Bunches of KHASAB *Khalal* ($\frac{1}{10}$ natural size).

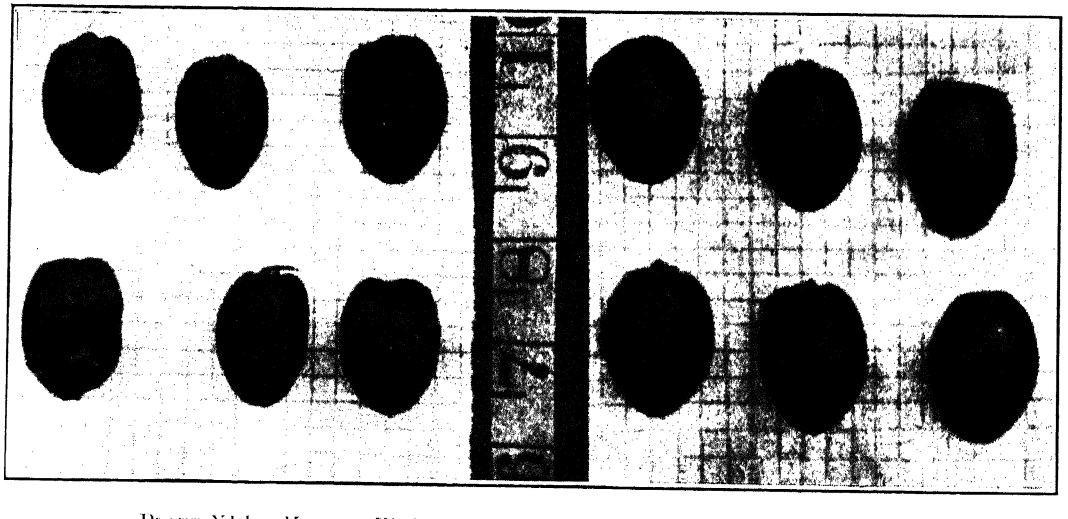

PLATE XLI. KHASAB *Khalal* on the left, *Ratab* on the right ($\frac{3}{4}$ natural size).

32. KHASAB.

GENERAL.

Dates of this variety are the last to ripen; sometimes they are allowed to remain on the palms until the coming of the Christmas frosts. Although its flavour is but indifferent, yet a date which so lengthens the season for fresh dates does not lack popularity. About one in six thousand palms on the banks of the Shatt Al 'Arab is of this variety, and it is to be found on the banks of the Tigris as far north as Baghdad; and it is also present at Badrah, but has not been met with on the Euphrates. Despite the fewness of the palms of this variety on the banks of the Shatt Al 'Arab, yet there is an annual export of KHASAB *khalal* by *bowam* (Arab sailing vessels. See Plate 35 in Part I.) to Kuweit. The bunches are loaded into the hold, where the pressure and the heat help to ripen them, so that by the time they arrive at their destination they have mostly become *ratab*, and are then edible. The average yield of twelve palms in 1919 was found to be 65 lbs. At Abul Khasib (11/10/19) KHASAB *khalal* on the stalk were being sold for export at 9 Rs. a *man* of 152 lbs.

THE PALM.

The trunk is stout and the general appearance of the palm vigorous. The fronds are of medium length, stout, and not set very upright; and their bases are big and green, sometimes flecked with black. The leaflets are few, long, wide, and drooping. The spines are many, short, and stout.

THE FRUIT.

The fruits are of the soft type, and of medium size, rounded and but little pointed. The *khalal* are a bright carmine in colour, and give the palms a picturesque appearance; and, since they are very late in ripening, the palms bearing them during the autumn are distinguished readily from those of neighbouring varieties. The *ratab* become a dull red brown, and the *tamar* a rich purple black. The *khalal* are only slightly astringent, but are lacking in flavour. The *ratab*, however, are edible, and the *tamar* also are pleasant to eat.

33. KHASTAWI.

This common variety of Baghdad and northern Lower 'Iraq was reported as being present in date gardens bordering the Shatt Al 'Arab, but it was never seen by the present writer so far south. The date is not unlike the KHADHRAWI in many respects, and may be said to take the place of that variety to some extent in the north of the country. It is found on the banks of the Euphrates as far north as Hit, and also at Badrah and Jisan.

PLATE XLII. A KHINAIZ Palm.

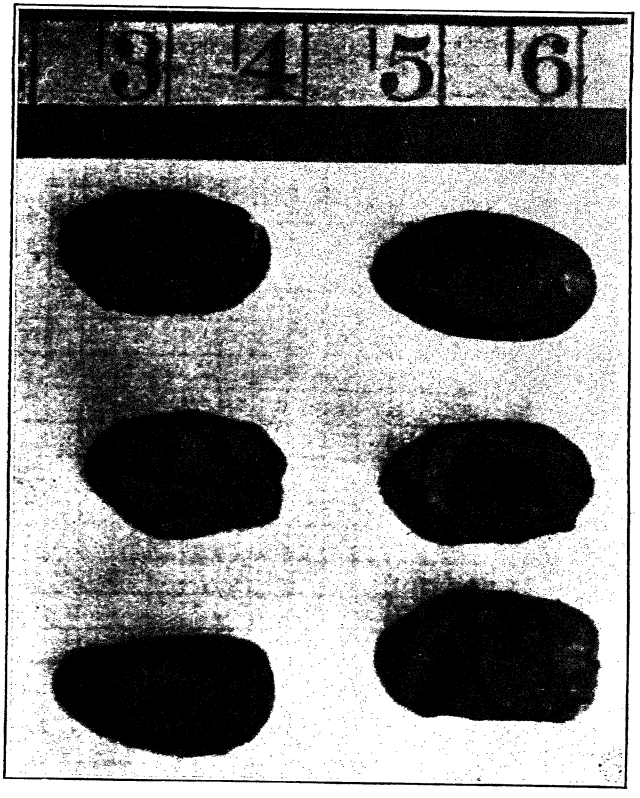

PLATE XLIII. KHLAS *Tamar* (¾ natural size).

34. KHINAIZ.

GENERAL.

This variety of palm is stated to be common in the Hasa, and to yield there heavily. It is one of the rarest of palms in the Shatt Al 'Arab date gardens, and the yield in this region is very low.

THE PALM.

The palm is large and handsome, and the fronds are long and do not droop at the tips. The leaflets are long and thin, and give the palm a feathery appearance.

THE FRUIT.

The *khalal* are long and big and a light, dull pink in colour. The *ratab* are deeper and more brown in colour, and the *tamar* are almost black.

35. KHLAS.

GENERAL.

This variety, which also is stated to be native to the Hasa, is to be found in the 'Iraq only very occasionally in Shatt Al 'Arab date gardens. Fairchild speaks glowingly of the excellent qualities of its dates in its native habitat; but, on the shores of the Shatt Al 'Arab these do not appear to possess any marked delicacy of flavour.

THE PALM.

The palms possess a slight resemblance to those of the variety LILWI. The trunk is thin to medium; the fronds are upright, long, and not bunched in the centre of the palm "head," and their bases are green. The numerous leaflets are long and upright; and the spines are thin.

THE FRUIT.

The dates are of the soft type, and small to medium in size. They are barely pointed at the apex, and their general outline is sub-elliptical or irregular. The *khalal* are deep yellow with a faint flush of red; the *ratab* are dull gold; and the *tamar* are a buff brown in colour, resembling the yellower sort of ISTA'AMRAN. There is a tendency to "wrinkle" or "blister." One hundred *tamar* weighed 33·0 ozs.

PLATE XLV. MAKTUM *Tamar* from Mandali ($\frac{1}{1}\frac{5}{6}$ natural size).

PLATE XLIV A Young MAKTUM Palm

36 LILWI.

GENERAL.

Palms of this unimportant date variety are to be found in the 'Iraq only in the gardens bordering the Shatt Al 'Arab and the Lower Tigris. The dates are remarkable in being the smallest and most nearly spherical of all. They ripen late, and the *khalal* sometimes are exported late in the autumn to Kuweit with those of KHASAB. The average yield of three palms, the yields of which were weighed in 1919, was 47 lbs.

THE PALM.

The trunk is thin to medium in girth. The short fronds are not stout, straight from base to tip, and medium to numerous in number, but not bunched in the centre of the palm "head." Their bases are small and green. The few leaflets are short, narrow, and only slightly drooping. The spines are few, short and thin.

THE FRUIT.

The very small, almost spherical *khalal* are yellow and of pleasant flavour. The *ratab* are reddish, and are eaten; but the damson-like, blue-black *tamar* are not pleasant to eat. This is an inferior date.

37. MAKTUM.

GENERAL.

This date variety is to be met with in all parts of the 'Iraq where dates are grown, but is nowhere common. In the Shatt Al 'Arab district it is especially rare, and is not met with more often than about once in ten thousand palms. The palms are said to yield heavily.

THE PALM.

The palms have one feature whereby they may readily be distinguished from those of most other varieties, namely, the droop in the tips of the fronds. In this respect they are similar to HADAL palms. The bases of the fronds are black and green, and the fronds themselves are yellowish.

THE FRUIT.

The fruit is of the soft type, and of medium length and width, though MAKTUM dates vary much in size and shape. The *khalal* are yellow, and the *tamar* golden brown. Dates in all the three stages are edible, but in none are they of especially good flavour.

PLATE XLVI. A NUKSH AL MUBRID Palm.

PLATE XLVII. A SHIRĀNI Palm (the tall palm to the right).

38. MIDAD.

Garden owners reported this variety to be present in the Shatt Al 'Arab area, but no specimens of the palm or of its dates were encountered by the author.

39. NUKSH AL MUBRID.

GENERAL.

Only one palm of this variety was seen in the 'Iraq, at Bait Na'ama, but the name seems to be known to many garden owners, and individual palms of this variety are said to be present here and there in the Shatt Al 'Arab date district.

THE PALM.

The only palm trunk examined was stout; and though it was old, it had not worn smooth. There were many fronds of medium length, borne on the palm more vertically than horizontally, and there was no drooping at the tips. The frond bases were small and green, and the numerous leaflets were short and of medium width. The spines were many, long, and thin. The fruit was not seen.

40. SHIRĀNI.

GENERAL.

This is a very rare variety of the Shatt Al 'Arab, and has not been reported from anywhere else in the 'Iraq. It is remarkable in possessing *chimri* which are sweet and edible. Most of the crop is consumed in the *khalal* stage by the garden owners, because the *tamar* are desiccated and unpalatable.

THE PALM.

The palm has a general appearance suggestive of KHADHRĀWI. The trunk is thin, and the fronds are short, of medium stoutness, and with green bases. The numerous leaflets are wide and upright. There are many spines of medium length and breadth.

THE FRUIT.

The *chimri* are not possessed of any very pronounced flavour, but they are exceptional in that they are sweet and free from soluble tannin. The dates are of medium to large size, and very closely resemble those of the variety HALĀWI, though the *tamar* are drier than ordinary HALĀWI and have a thicker skin. The *khalal* are yellow, the *ratab* a dull and deeper shade of the same colour, and the *tamar* are a deep and rich amber.

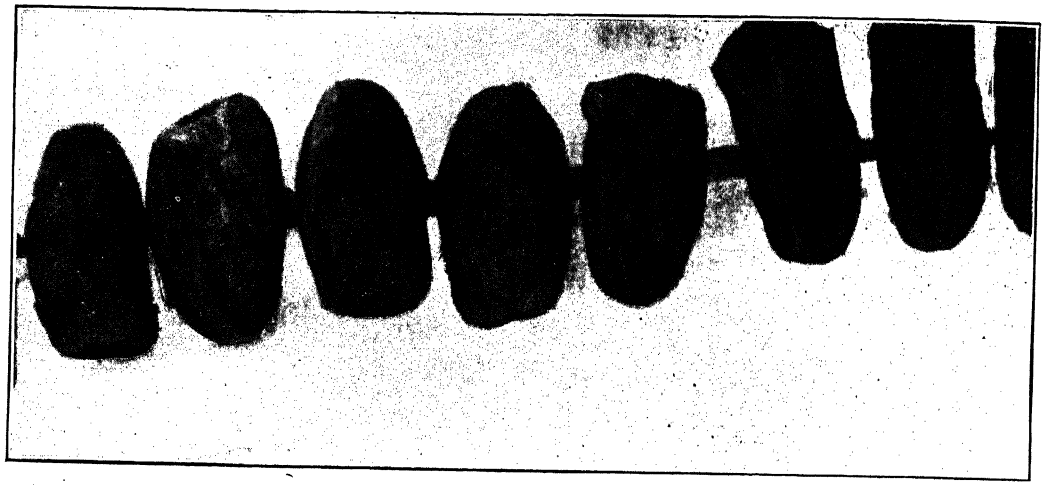

PLATE XLVIII. SHIRĀNI *Tamar* (¾ natural size).

41. SHUKAR.

GENERAL.

About one palm in three hundred in Shatt Al 'Arab date gardens belongs to this variety; and it is also represented in all date-producing areas on the Tigris and upper Euphrates rivers, though it has yet to be reported from the lower part of the latter river. There is no separate export of these dates, and it is only occasionally that they are to be obtained in the Basrah market. As a rule they are packed in baskets with ISTA'AMRĀN, and their exceeding richness much improves the latter. For the making of *dibis* or date syrup they are especially valuable and renowned. The average yield of *tamar* dates of twelve palms was found in 1919 to be 39 lbs.

THE PALM.

The trunk of the palm is thin; and the fronds of medium number, short, thin, neither very upright nor horizontal, very slightly drooping at the tips, and their bases are small and green. The numerous leaflets are short, of medium width, and not drooping. The few spines are short and thin.

THE FRUIT.

These dates are of the soft type, small to medium in size, and long. The *khalal* are yellow, the *ratab* light gold, and the *tamar* a light brown, somewhat resembling those of ISTA'AMRĀN of the inferior sort. The *khalal* are not particularly pleasant to eat, and many find the *tamar* too sugary and sticky for their taste, but nearly all agree in praise of the excellence of the *ratab*.

42. SHWAIDI.

Though garden owners stated that this was a variety of the Shatt Al 'Arab, yet no palms or dates of this kind were seen by the author. SHWAITHI was said to be a synonym for SHWAIDI.

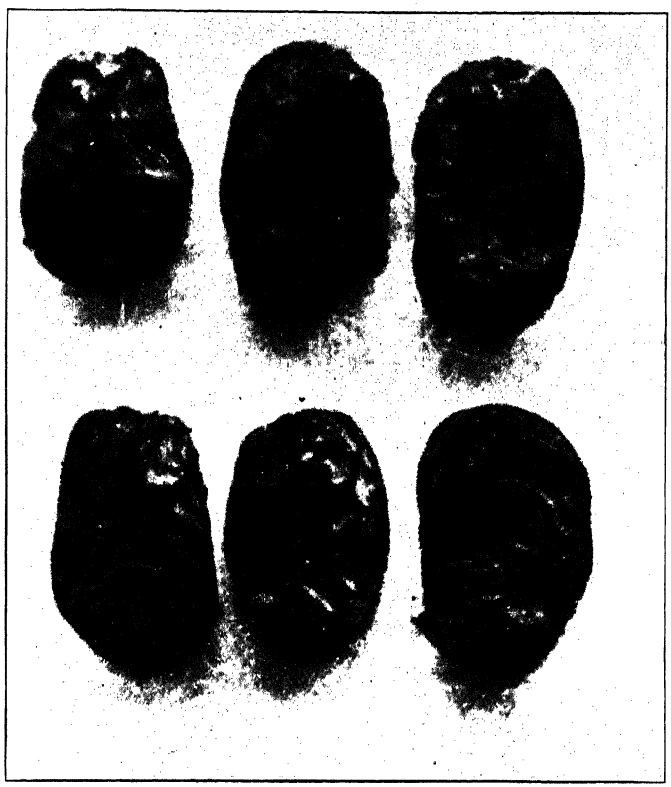

PLATE XLIX. SUKRI *Tamar* ($\frac{15}{16}$ natural size).

43. SUKRI.

Palms of this variety were not seen, but some large dates bearing this name were shown to the author. The average weight of two separate weighings, each of one hundred *tamar*, was 47·0 ozs. This variety is described as distinct from the SHUKAR; the dates seen were certainly not those of the latter variety.

PLATE L. A SWAIDAN Palm (marked with a white +).

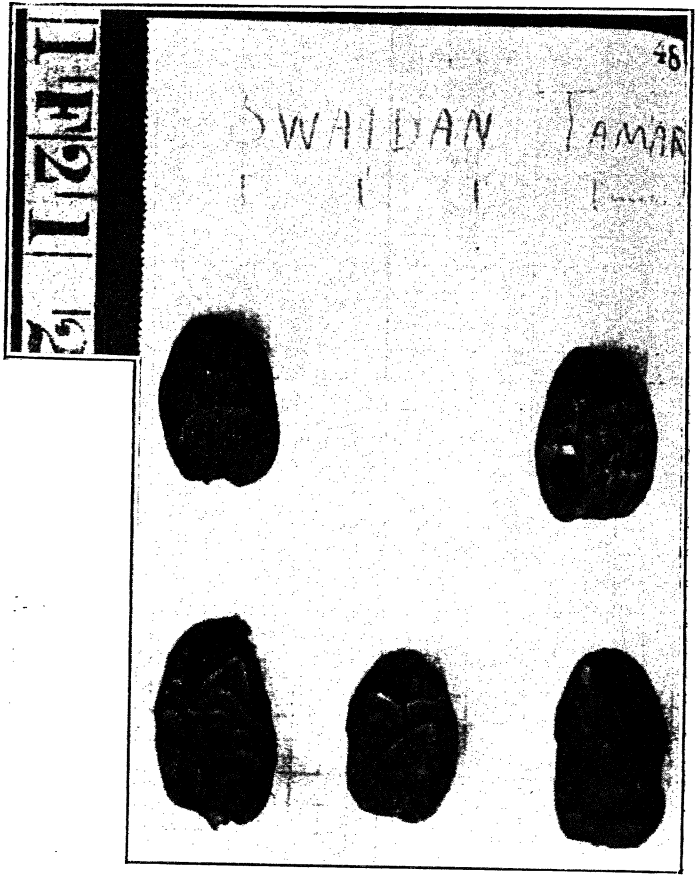

PLATE LI. Small Specimens of SWAIDAN *Tamar* ($\frac{3}{4}$ natural size).

44. SWAIDAN.

GENERAL.

SWAIDAN palms are reported to be numerous at Bahrein; but, in the 'Iraq, they are to be found only in gardens bordering the Shatt Al 'Arab, and even there they are present only at the rate of about one palm in two thousand. The yield in the 'Iraq is said to be low.

THE PALM.

The handsome palms resemble those of the variety HALAWI. The trunks are stout; the fronds are long, erect, and have large bases; and the spines are few and long.

THE FRUIT.

These dates and those of the variety 'AWAIDI are the biggest of any grown in southern Lower 'Iraq. Some reach a length of two-and-a-half and a width of one-and-a-half inches, but the majority are smaller than this, though all are remarkably big. The stone is broad but not very long. The *khalal* are bright yellow, slightly tinged with orange, the *ratab* a dull golden brown, and the *tamar* deep brown, not unlike the colour of dark HALAWI. The *khalal* may be eaten, for they contain but little soluble tannin, but they have no particular merit. The *ratab*, on the other hand, are excellent; and the *tamar* are particularly sweet, luscious, juicy, and well-flavoured. A hundred *tamar* weighed 36·0 ozs.

45. TABARZAL.

This common Baghdad variety was reported to be present in the Shatt Al 'Arab date country, but the present writer was never able to find it further south than Qalat Salih.

46. UMM AL BAKHUR.

The presence of palms of this variety in the Shatt Al 'Arab date district was reported to the author, but he did not succeed in discovering their whereabouts.

47. UMM AL DIHIN.

GENERAL.

Only one palm of this variety was met with in Shatt Al 'Arab date gardens; but, although it was so scarce, it seems to be a well-known variety. This may be due to the peculiarity it possesses of very rapid ripening. The *chimri*

appear to become *khalal* suddenly, and the *tamar* are *hashaf* ("dried-up") almost as soon as they are *tamar*. Consequently, this date is not eaten in the *tamar* stage, but only as *khalal* and *ratab*.

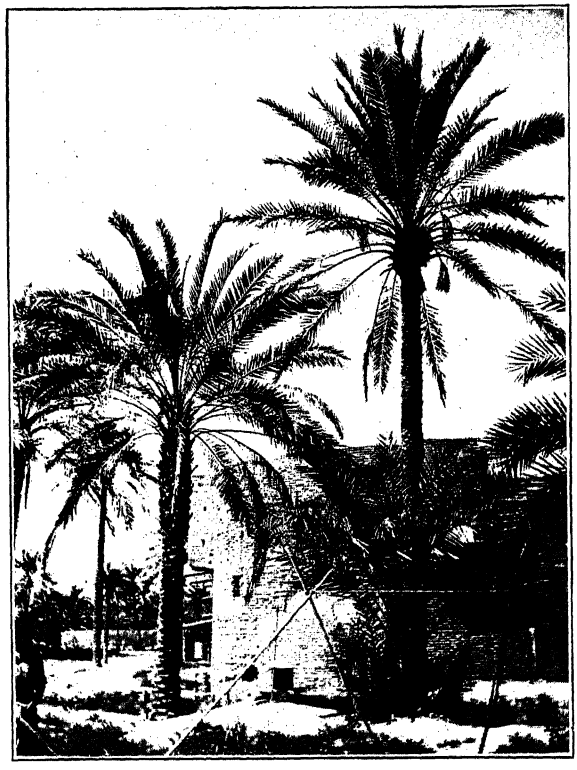

PLATE LII. UMM AL DIHIN Palm on right, HALAWI on left.

THE PALM.

The trunk is of medium girth; and the fronds are long and strong, neither many or few. Their bases are black, yellow and green; and their tips do not turn downwards. The numerous leaflets are short and wide.

THE FRUIT.

The date is long and narrow, and the widest part is nearer the apex than the base. The *khalal* are greenish yellow with a little red at the base; and it is mostly in this stage that they are eaten. The unpalatable *tamar* are shrivelled and resemble dates attacked by the *hashaf* disease.

48. ZAHIDI.

GENERAL.

Popenoe derives the name of this variety from *azada*, which, he says, is Persian for "nobility." The explanation is unconvincing.

There is no large date-producing area in the 'Iraq where ZAHIDI palms cannot be found, and, in the north and on the Euphrates, this is the commonest variety. On the Shatt Al 'Arab, however, it ranks fifth in order of frequency, constituting about three per cent. of the palm population.

Both Fairchild and Popenoe remark especially upon the power of resistance to drought possessed by palms of this variety. In the Shatt Al 'Arab date region, however, all the ZAHIDI palms grow close to the river bank, and none are to be found on the desert edge, nor are they to be met with in the salt water district of Fao. Palms of this variety are remarkably free from attacks of the *hashaf* disease; and, as one of the commoner signs of a palm suffering from drought is an attack of this disease, it may be that this fact offers an explanation of the reputation that this palm has acquired in America for resistance to drought.

These vigorous and early maturing palms bear their dates late in the year, but in great quantity. The average yield of fifty-two palms was 126 lbs., and of these the highest individual yield was 237 lbs. This is the highest single yield for a palm recorded for any variety during the 1919 experiments on the Shatt Al 'Arab, when the yields of 930 palms were weighed.

All markets of the 'Iraq stock ZAHIDI dates in one or more of the forms in which they are sold, *gas* (on the bunch), *yabis* (loose and dry), *halan* (moist and in baskets), or *kursi* (moist and in skins). In northern Lower 'Iraq baskets are replaced as a rule by skins which are not good enough to hold water, because there is a plentiful supply of them obtainable from rafts which have floated down from Mosul. Rafts do not travel as far as Basrah, and, consequently, skins in this town are dear; also, so much of the Shatt Al 'Arab date harvest is exported in boxes that date leaflets for basket making are plentiful.

Being the cheapest of dates and also the richest in invert sugars, ZAHIDI are largely used in the manufacture of *araq*, a kummel-like, alcoholic liquor. At the Basrah factory, ISTA'AMRAN and the other dates which are available are used in addition, but, at Baghdad there is very little *araq* which is not made from ZAHIDI dates.

At Basrah (17/10/19) the wholesale price of *tamar* of this variety in baskets was 400 Rs. a *karah* of 6048 lbs., at the same time that ISTA'AMRAN were realising 400 Rs. At Amarah (28/12/19) dry ZAHIDI were being sold

loose at 20 Rs. an Amarah *man* (1 cwt.); at Baghdad in January, 1920, the retail price of *tamar* in skins was 18 Rs. a *waznah* of 224 lbs., at Musayib (31/3/20) the same kind of dates in a similar state were being sold at 15½ Rs.

PLATE LIII. A Young ZAHIDI Palm.

for the same amount, and twenty-five days later they could be purchased retail for 12 Rs.

There is a large export of these dates from the Shatt Al 'Arab by sea in baskets (A. *halana*, pl. *halan*, each holding 40 to 60 lbs.) to India, the Persian Gulf, and Arabian ports, and from the Baghdad and Euphrates date areas a much larger export overland in skins to Persia, Upper 'Iraq, and north and central Arabia. The only dates that many of the nomads of the DULAIM and other tribes of the north-east of Arabia have tasted are ZAHIDI. In 1917, 4,000 tons of ZAHIDI dates are said to have been exported from Basrah by sea.

This variety is a favourite, because the offshoots are cheap to purchase, the palm is hardy, quick growing, and heavy yielding, and the price of its dates is not sufficiently below that of the other common varieties to counterbalance these advantages.

THE PALM.

These strong growing palms have stout stems. The many fronds are long, thick, straight, and erect. When dry they break rather easily, in this respect differing from those of HALAWI palms, which are more pliable and less brittle. The bases of the fronds are big and yellow-green or yellow, and do not weather down, so that even an old palm does not show a smooth trunk. The many leaflets are long, narrow, erect, and of a glaucous green. ZAHIDI palms bear stout spines, more numerous and longer than those of the palms of any other female variety.

THE FRUIT.

The only variety of date with which those of ZAHIDI could be confused is the Baghdad and Hit variety, UKHT AL QASAB, also known as UKHT BADRAIAH, the dates of which are somewhat similar in shape. The dates are of medium length and rather over medium width, and the widest part is not, as in the case of most dates, at the centre or towards the flattened base, but nearer the apex. One hundred very dry *khalal*, grown on a dry palm seen late in the season weighed 27·5 ozs., and the average weight of four separate lots each of one hundred *tamar* was also 27·5 ozs. Normal *khalal* should weigh nearly twice this. The skin is glossy and adheres to the flesh closely. The stone is large. In colour, the *khalal* are a light yellow, the *ratab* a deeper and more brown shade of the same colour, and the dry *tamar* buff. The pressed, sticky *tamar* of the baskets and skins are a light yellow brown. The *khalal* are astringent and the *ratab* slightly so. The flavour of the *tamar* generally is considered indifferent, but there are many people in the Baghdad and Euphrates districts who consider the flavour of the dates of this variety superior to that of the same variety grown on the banks of the Shatt Al 'Arab. Arabs consider these dates "hot."

MALE DATE PALMS

There appears to be no reason why there should not be as many varieties of male date palms as of female, but the number reported is insignificant. That so little attention has been paid to the males is doubtless because date palms are raised from offshoots and not from seed; and, consequently, all that is required of the male is that it should provide pollen, the kind of pollen being immaterial, since the edible parts of the fruit which its action will cause to be produced are entirely maternal in origin. It is, however, important to the grower of dates that the pollen produced by his male palms should be abundant; and, from this point of view, there is some indication of a system of classification of male palms in the Shatt Al 'Arab district. GHANAMI, WARDI, GRAITLI, and SMAISMI are the names of four of the more uncommon varieties which are said to produce a plentiful supply of fertile pollen, and of these Fairchild reports Haji Abdulla Nejem as having stated that GHANAMI is the best. Each garden owner, however, seems to have his own preferred kind, and little definite information is available. All the males at Fao are called GHANAMI; further north, these are seldom encountered. The common male palm of the whole Shatt Al 'Arab region is the KHIKRI, a rankly growing, vigorous palm, easily distinguishable from surrounding females by its greater height, greater girth, larger number of fronds, and more numerous and bigger spines. Palms of the previously mentioned four varieties, though bigger and more vigorous than most females, are supposed to be less robust than those of the ordinary KHIKRI. The identification of male varieties of date palms seems to be a matter of much difficulty; because cultivators seldom agree when asked the variety of any particular male palm met with. Frequently a garden owner states that such a palm is a KHIKRI, as one might say of a female palm, "That is a DIGLA," that is, just a seedling palm of no definite variety. Indeed, the author suspects that the distinguishing between male palms is a matter which can be carried out satisfactorily only by breeding experiments, and by observing the characters of the generations produced when unknown males are crossed with known females.

At Baghdad, FAHAL DIGAL (i.e. "male seedling") is the term applied to most male palms, though there are some which are called FAHAL ASHRASI, from a fancied resemblance to ASHRASI palms, *fahal* being the Arabic word for "male." Fairchild mentions that in the Semail Valley (Mascat), as far as he could gather, male palms were called simply *fachl*, and in Kej (Baluchistan) *gush*. Both words signify "male." Swingle reports a male variety, DEGLAOUI, from Tunis. This word would appear to be merely "seedling." Mason says that males are not distinguished by varieties in Tunis. Swingle also alludes to DAKAR MAJAHEL as a male variety of Egypt, but these words translated are simply "unknown male." No other authorities consulted mention male varieties.

APPENDIX I.

LIST OF FEMALE DATE VARIETIES OF THE WORLD.

AGHLEEN
AGLAWY
AJWAH
AKHU KHASTAWI
ALI MUSA
ALIQA
ALI RASHID
AMAMAT EL KATHIE
AMHAT
AMIR HAJ
AMOUWEE
AMREER
AMRAN
EL AMZOUGH
ANGOO
ANJASI
APDANDON
ARESHTEE
'ASABIAT AL ARUS ('Iraq)
ASAB' AL AROOS (N. Africa)
AS-HAG
ASHGAR
ASHRASI
'ATRI
AURA
AUREGH
AUSHEH
'AWAIDI
AYATA
AZMASHI

BADINJANI
BADRAIAH
BAGLA
BAGUM JUNGHI
BAJLANI
BALTCHIK
BANI RABA
BARBAN
BARHI
BARONIAD
BARTLETT
BATNA
BAYDH HAMMAM
BAYJOO
EL BEEYOUTH
BENNET
BENTAMODA
BENT KEBALLA
BENT SEGNY
BERNI
BESSER HALOO
BINAFSHAH
BINT AESHA
BINT AL SA'BA
BIRNY
BOBAK
BOO AFFAR
BOO FAGOOS
BORNEE
BRAIM
BU HAFS
BU NARINJA
BURLOS
BURNI
BURSHI
BUSKRI

CHALABI
CHEDAKH
CHIBCHAB
CHUPAN
CHUPSHOOK
CORRAGIA

DAAILI
DACHWANI
DAIRI
DEBOENIEH
DEGLET BEIDA
DEGLET BARCA
DEGLET CAID
DEGLET HAMIDATOO
DEGLET HASSEN
DEGLET NUR
DEGLET SENNAYGA
DENGUI
DIGAL
DIGAL 'ABAS
DIGAL 'ABD AL 'ALI
DIGAL ARUS
DIGAL HASUNI
DIGAL MIASI
DIGAL MUSA
DIQWAINI
DISHTARI
DJEBELY
DOONGA
DOUM
DUGAL BADAM
DUGLAT EL HATOON
DUGLET HILWAH
DUNDARI
DUWAICH

EL FA

FALAH
FALIG
FARAKH 'ABAIDH
FARD
FARSI
FERTAKOU
FINDUKIEH
FRIHY
FTEEMY
FUKUS

GAHARA
GANTAR
GARBAN
GARDIWAHL
GARGANI
GASB HALOO
GASBY
GAZALY

GHAZI
GONDEILA
GOND GORBUG
GONZELLI
GOONDY
GUERN EL RHEZAL
GUETTARA

HABABA
HABRA
HABSI
HADAL
EL HAFALEE
HAIRI
HAJAB
HALAWI
HALAWI MAKHAWI
HALLANI
HALOOA
HALOOA BAYDA
HALOOA HAMRA
HALAIAH
EL HAMAJ
HAMRAWI ('Iraq)
HAMRAWI (Egypt)
HAMRAYA
HASAN EFFENDI
HASAWI
HASHNA
HAWAIZ
HAYANI
HELEYA
HELOUA
HELW
HILALI
HILWAH
HILWAT AL JOF
HORRA
HURSHUT

IBRAHIMI
IBRIMI
ISTA'AMRAN
ITEEMA

IZDAIFI

JAFAILI
JALGHI
JAMAL DIN
JAOW ISWOD
JAOW OBIAD
JINFAKH
JOHARA
JOZI

EL KADEER
KAIBY
KALARA
KALES
EL KAMAR
EL KARAFES
EL KARATAWEE
KAROOY
EL KAUB
KENTA
EL KERBAOUWEE
KHADHRAWI
KHADHRAYA
KHALT BOO FAGOOS
KHALT DEGLAOWIA
KHALT GAMA
KHALT HAMEED
KHALT HORRAOWIA
KHALT KEBEER
KHALT KENTAOWIA
KHALT MENAKHRY
KHALT MOOASHEM
KHAM OFI
KHARBA
KHAROO
KHAROOBY
KHASAB
KHASTAWI
EL KHATHAR
KHATIBI
KHIARA
KHINAIZ
KHLAS
KHOODHARRI
KHUZAYRIYAH
KISHRA
EL KOKAEE

KOROCH
KOSHA
KOURMOUZOU
EL KOUWEEYAF
KSEBA
KULMA

LAGHOUL
LAGOO
LAUN
LEMSY
LIEDI
LILWI
LOOREEK
LOOZEE
LOUKALEE
LOUNT
LY KATOONA

MADINI
MAJHUL
MAJMOODA
MAKARESH
MAKAWI
MAKAWIEH AHMAR
MAKAWIEH ESHGAR
MAK-MAK
MAKTUM
MANAII
MASHI DEGLA
MASIDHEH
MASSOWA
MAZARRAF
MENAKHER
MIDAD
M'KENTICHI DEGLA
MOKH BEGRY
MOGANAHA
MOMAK AL HAMRA
MOZARTY
MUBSLI
MURDASING
MURRI
MUQATAB
MUZNAJ

NAFOUSH
NAFZAWEE
NAGAL
NAJL AL PASHA
NAHKLEH ZIANEH
NAKHLET AL PASHA
NAN EL DIN
NIMKADAMI
NIRZI
NUKSH AL MUBRID

OBAIDI
OKHT AMMARY
OKHT FTEEMY
OMM-ELLS-THHAB

PHOUNTOUK

QIANI
QITAZ
QUSH BATASH
QUSH FARFARA
QUSH HASAS
QUSH SHAHIN
QUSH ZABAD

RACHIDI
RAMLI
REKAB
REMTA
RHARS
RISHTA
ROGANI
RUHM AL GHAZAL

SA'ADA
SAADA HUMRAH
SABIER
SAFRA EL AUESCI
SAFRAWIAH
SAIDI
SAISANDALI
SALOULOU
SALOUM
SALTANI
SARAIH
SARNA
SAYBA BOO DRA
SEEWAH
SELATNY
SHABIBI
SHAGRA
SHAGRA MOOBARAK
SHAHARI
SHAKARI
SHAMUS
SHAPEGO
SHAQRA
SHARAN
SHELEBI
SHIRANI
SHITAL
SHUKAR
SHWAIDI
SIN MUFTA
SOONT GORA
SUBZOO
SUKRI
SUKHAR NABAT
SULTANI
SUNAL
EL SUNBILBIL
SWAIDAN
S'WEYFLY
SYHANY

TABARZAL
TABASHIR
TAFAZWEEN
TAGHAIAR
TAGHEDSHAH
TAIB
TAIB BELAH
TAKADAF
TAKERMEST
TALUS
EL TAMESKAL
TAMR
TANTABOOSHT
TASER SEIT
TASFERT
TEDDALA
TEDMAMA
TENNESIN
THAHABEE
THURI
TILLIS
TIMFUHAST
TIMJOOERT
TIN AKHOR
TIN ASER
TKESA
TOOBAIQI
TOUATEE
TOWADANT
TOZER ZAID KHAIA
TOZER ZAID SAFRA
TRONJA
TUFAHA

UKHT AL QASAB
UMM AL BAIDH
UMM AL BAKHOOR
UMM AL DIHIN
UMM AL JAMUS
UMM AL KHIAR
UMM AL TUWAL
UMM JAHARA
URUMAIYAR
UWAIN TAYUB

WAHSI
EL WASHA
WASHCLONT
WEDI
WOLFSKILL

ZADAD
ZAGHLOUL
ZAHIDI
ZAREK
ZARIQAH
ZARIQI
ZARYA
ZEKRY
ZOBAIR
ZRAI
ZUMREH MIMUN

In the above list of three hundred and eighty different varieties of female date palms of the world, it is probable that there are included many synonyms. The difficulty of establishing synonymy caused by the inadequacy of most published descriptions of dates and their palms is accentuated by varying methods of transliteration employed by different observers. As an example of which difficulty may be mentioned the case of the date variety, BURNI, which Fairchild reports from Baghdad and from Oman. It is possible, but there are at present no means of establishing the fact, that this is the same variety as Doughty's BERNI of the Shammar, Burckhardt's BIRNY of the Hejaz, and Richardson's BOR'NEE of the Fezzan.

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APPENDIX III.

ETYMOLOGY OF THE WORD "DATE."

The first recorded use of the word "date" in the English language is a reference of 1290 A.D. (S. Eng. Leg.). Early English voyagers also make use of the words *dachel* and *dadel*. The word "date" and the corresponding words in the European languages seem all to be descended directly from the Greek, which is regarded as having been derived from the Hebrew *dachel*. The Russian name corresponds with the scientific name of the genus (*Phœnix*). Dates were introduced into China from Persia, and the Chinese name is as close an imitation as this tongue permits of the Persian. The Japanese took their word for "date" from the Chinese.

	Language.	*Fruit.*	*Palm.*
A.	Hebrew	Tamar, dachel	Daqal
	Syriac	Daqala	Daqala
	Arabic	Tamar	Nakhal Daqal
	Greek	Dactylos	
	Latin	Dactylus	
	Polish	Daktyla	Daktylova Palma
	O. Italian	Dattilo	
	Mod. „	Dattero	
	Portugese	Dactil, datil	
	Spanish	Datil	
	O. French	Date	
	Mod. „	Datte	Dattier
	German	Dattel	Dattel Palme
	English	Date	Date Palms
B.	Russian	Fenik	Fenikovaya Palma
C.	Persian	Kharma Tamar	Makh Darakht-i-kharma Nakhal
	Chinese	K'u-lu-ma	
	Japanese	Ku-ru-mi	
	Hindostani	Kharma	Khajoor, Karma
D.	Other Indian Dialects.		
		Chuhara	Kasser
		Kukyan	Mach
		Pind	Pind Chirdi
		Chirwi	Tar
		Jarikha	
		Tamara	Sindhi
		Perich-chankay	Perita
		Somblon-zi	Swonpalwon

APPENDIX IV.

ADDITIONS TO VOCABULARY OF DATE TERMS GIVEN IN PART I. OF THIS MEMOIR (PREVIOUSLY PUBLISHED.)

ARJUN.	*Syn. Athig.*
FASIL.	*Syn. Farakh.*
JOWL.	The larva of a burrowing beetle in palm trunks.
MASFA.	(*a*) Winnowing fork. (*b*) Net for baling *khalal matbook* out of the boiling water.
NAKHLA AITA.	*Syn. Tawilah.*
RAMAJ.	Dust. Applied to collections of scale insects on date palm leaves.
SAFIFAH.	Four inch wide palm leaflet matting used in the construction of *halan.*
SALBUAH.	Larval pest of stored dates.
SHISRAH.	*Syn. Charnib.* (Baghdad.)
TARKIZ.	The operation of so bending the bunches of young dates that they are supported by the fronds.
WAZNAH.	Measure of weight of 224 lb. (Baghdad and Euphrates.)

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